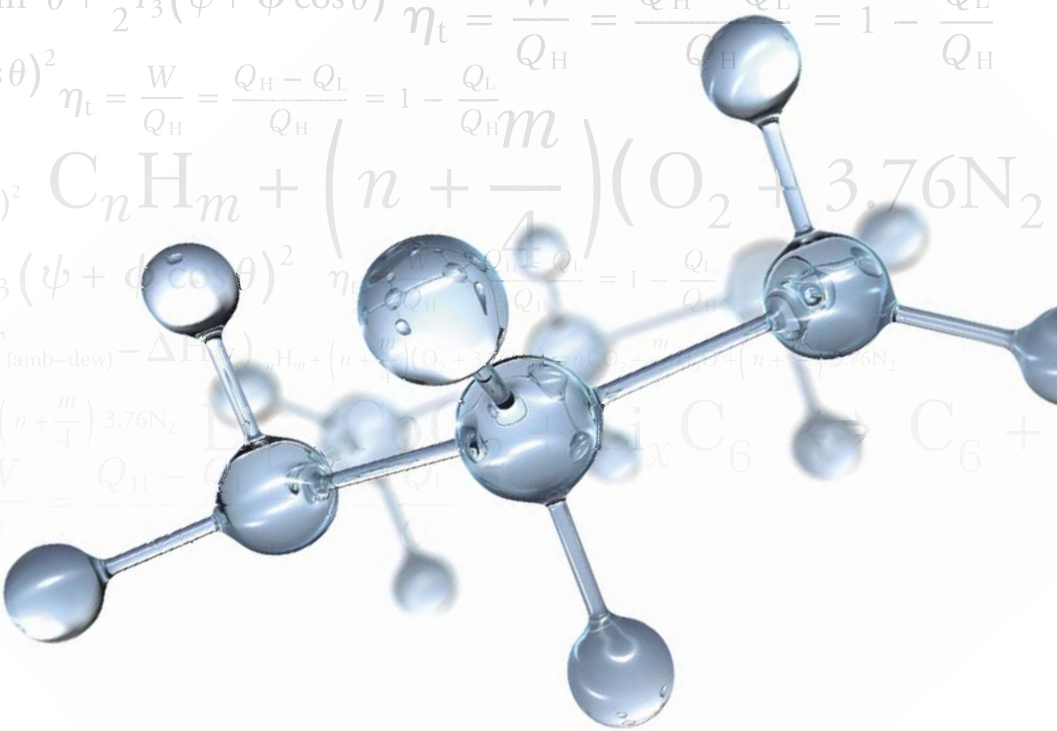
ExxonMobil

Taking on the world's toughest energy challenges.™

Outlook for Energy
A View to 2030



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The Outlook for Energy: A View to 2030

In our *Outlook for Energy – A View to 2030*, we see many hopeful things – economic recovery and growth, improved living standards and a reduction in poverty, and promising new energy technologies.

But we also see a tremendous challenge: how to meet the world's growing energy needs while also reducing the impact of energy use on the environment.

As the *Outlook* shows, ExxonMobil expects that global energy demand in 2030 will be almost **35 percent** higher than in 2005, even accounting for the recession that dampened energy demand in 2009. Other key findings include:

- Growth will be led by rapid expansion in non-OECD countries such as China and India, where energy usage will rise by about 65 percent.
- Demand will be particularly intense for electric power generation, which will comprise 40 percent of global energy demand by 2030.
- Oil and natural gas will remain essential, but other sources including nuclear and renewables (e.g., wind, solar and biofuels) will play an expanded role.

The future of energy is directly linked to the future well-being and prosperity of the world's people.

Today, about 1.5 billion people – a quarter of the world's population – lack access to electricity. Even more lack modern cooking and heating fuels. Expanding access to energy – and the opportunities it affords – should be a shared global goal.

Our energy and environmental challenges are intertwined and their scale is enormous. Today, energy use per person around the world varies dramatically but equates to an average of 200,000 British thermal units (BTUs) a day. Globally, that translates to 15 billion BTUs every second.

ExxonMobil believes that meeting future energy needs while also reducing environmental risk will require an integrated set of solutions that includes:

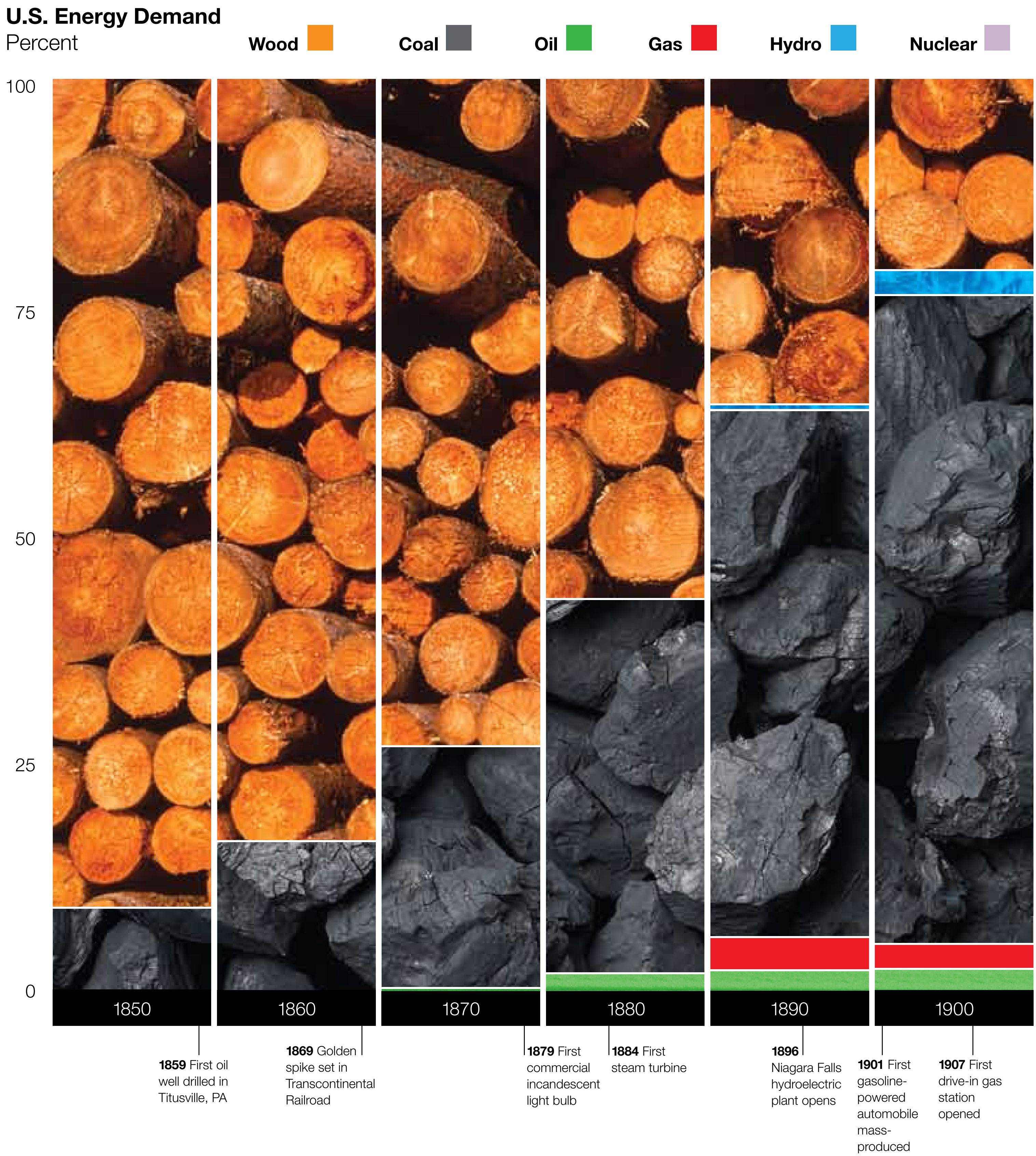
- Accelerating energy efficiency, which tempers demand and saves emissions
- Expanding **all** economic energy sources, including oil and natural gas
- Mitigating emissions through the use of new technologies and cleaner-burning fuels such as natural gas, nuclear and other renewable sources.

This multidimensional approach will need trillions of dollars in investment, and an unwavering commitment to innovation and technology that evolves over years and decades. It will require sound, stable government policies that enable access to resources and encourage long-term investments and technological development. And it will require the global energy industry to operate on a scale even larger than today.

Updated each year, *The Outlook for Energy* is a comprehensive look at long-term trends in energy demand, supply, emissions and technology. The report is built upon detailed analysis of data from about 100 countries, incorporating publicly available information as well as in-house expertise.

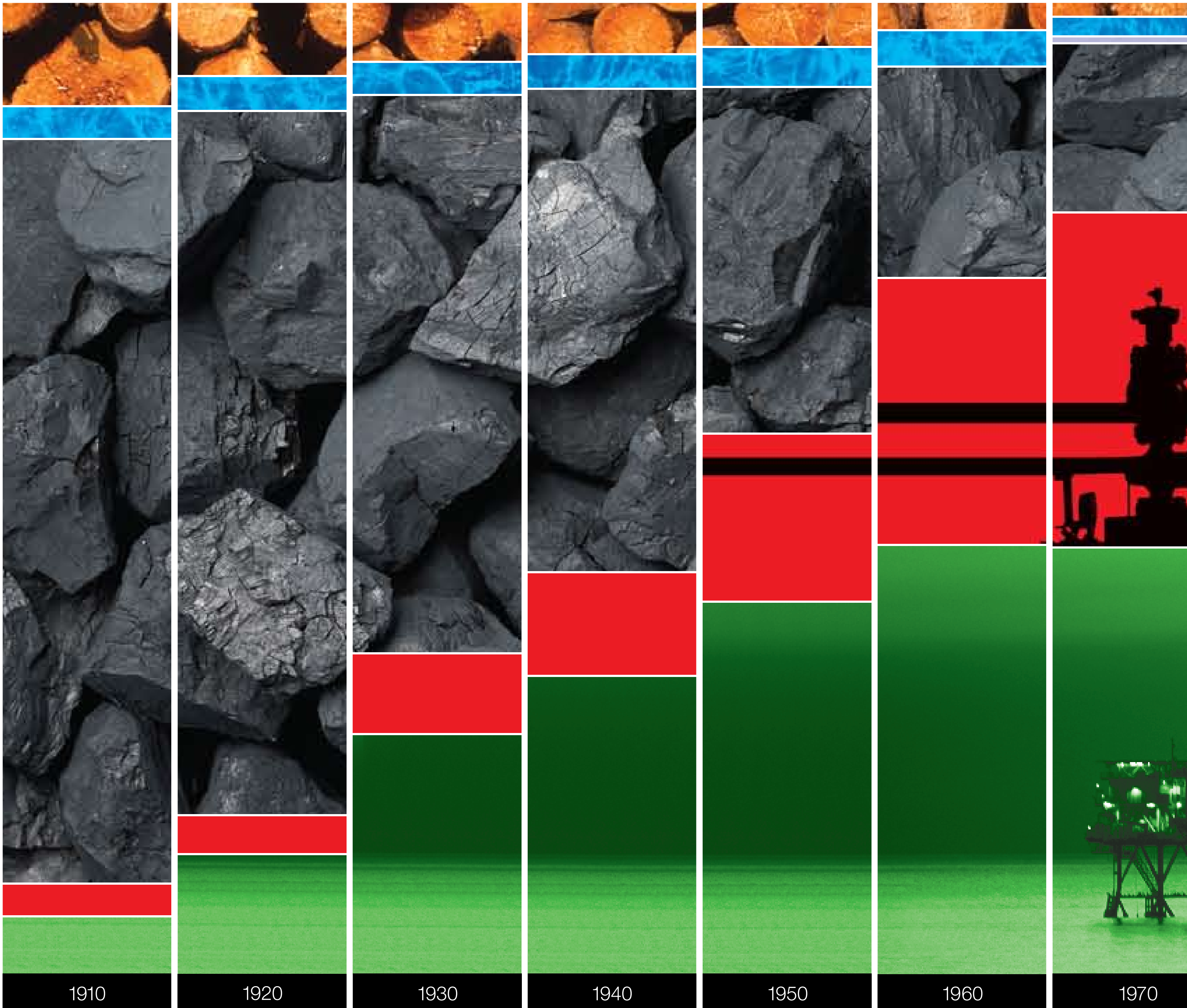
ExxonMobil uses the *Outlook* to guide its long-term investment decisions. We share it publicly to encourage a better understanding of our company, our industry and the global energy challenges that we all have a vested interest in meeting.

Transition to modern energy/technology



Modern Renewables

Source: Energy Information Administration



1916 First radio tuner

1927 Charles Lindbergh flies across Atlantic

1933 Philo Farnsworth develops electronic television

1936 Hoover Dam completed

1947 First offshore well out of sight of land

1952 First commercial jet service

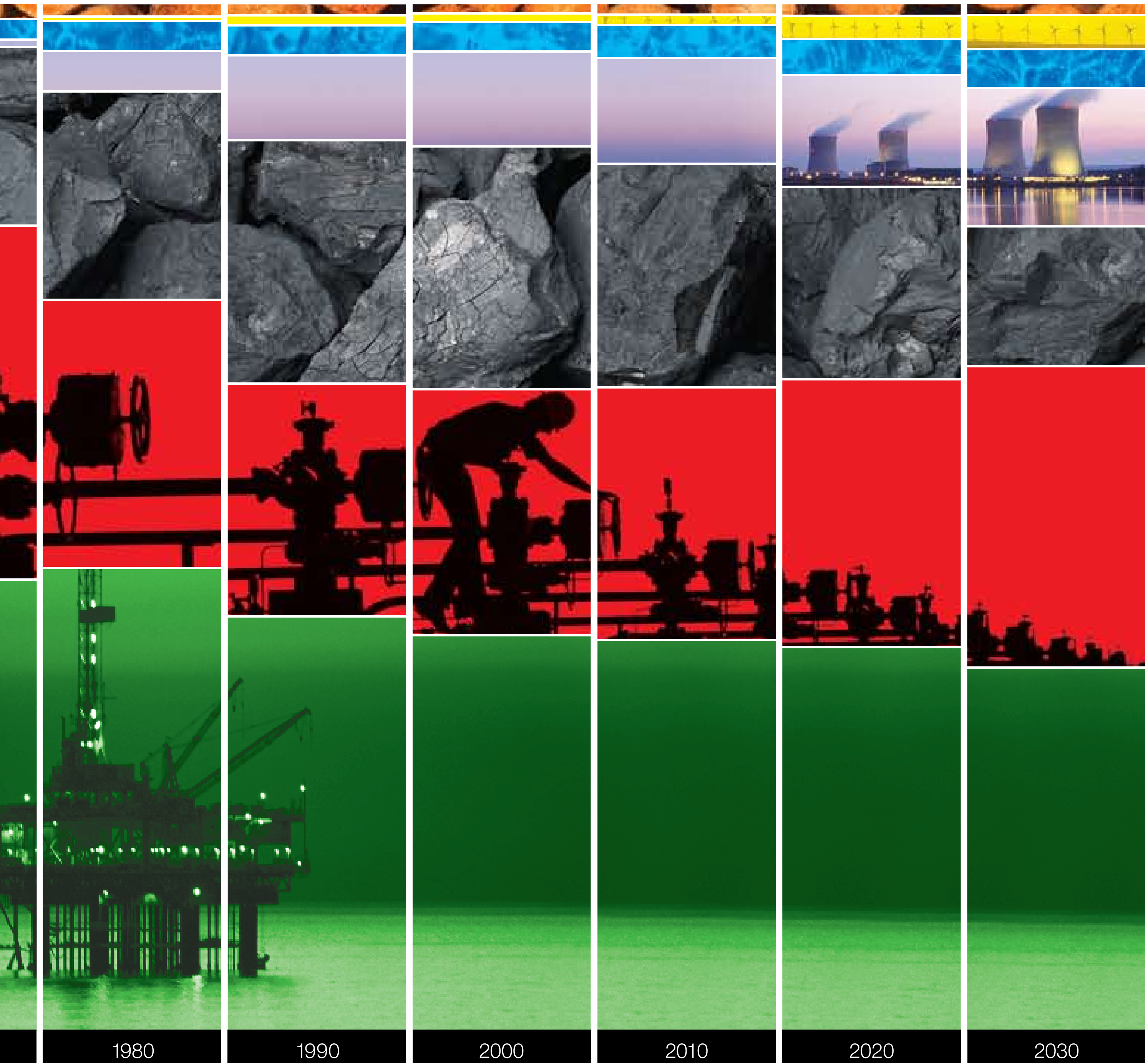
1954 Modern silicon solar cell invented

1956 Interstate Highway Bill signed

1969 First flight of the Concorde supersonic jet

1969 Man walks on the moon

1975 Vehicle fuel economy standards (CAFE) enacted by Congress



1979 First commercial citywide cellular network launched in Japan

1980 First U.S. windfarm consisting of 20 turbines built in New Hampshire

1981 IBM introduces personal computer

1991 First commercial lithium battery

1992 U.S. "Energy Star" program introduced

2001 Human genome sequenced

2003 First ultra-deepwater well depth greater than 3,000 meters

2005 U.S. mandate for ethanol blending into gasoline

2009 U.S. natural gas resources now cover about 100 years at current demand due to unconventional gas drilling technology advances (*Source: Colorado School of Mines*)

Evolution of energy and technology

Energy sources and technology evolve over time – and each influences the other. By understanding the history of energy and technology, we can better understand the future course of the energy challenge.

As an example, the history of energy use in the United States over the last 150 years illustrates the way energy use and technologies develop over time.

In the United States in 1850, wood was the biggest energy source. But by 1900, coal had become predominant. Technology played a role in this trend, as mining evolved and coal fed the newly industrialized nation. America's access to energy enabled its growth as an industrial economy; in turn, industrial growth and the wealth it created expanded U.S. energy demand. It is important to note that it took about 40 years for coal to achieve its substantial share.

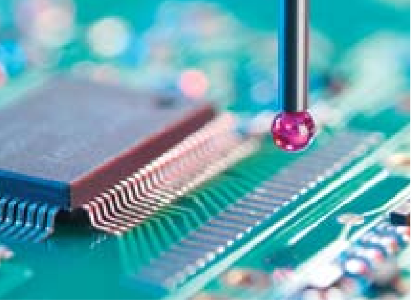
By 1950, oil was overtaking coal, as more Americans owned cars and rail transport shifted from coal to diesel. The growth of cars and trucks, as well as the birth of the commercial airline industry, meant a new need for transportation fuels. Improvements in oil-exploration technologies helped keep pace with this growing fuel demand.

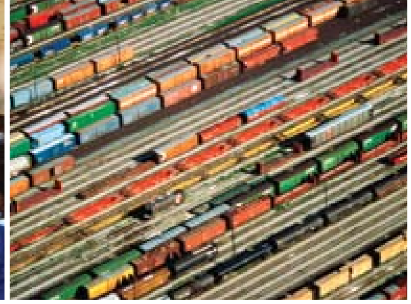
Also by 1950, hydroelectric power came into use. And natural gas, considered nearly worthless a generation earlier, grew as a fuel to meet the growing heating and industrial needs of an increasingly wealthy nation. Coal remained significant and helped meet growing electricity demand.

From 1950 to 2000, we saw the introduction and growth of nuclear energy and the first meaningful appearance of modern renewable fuels. Natural gas also continued to grow and was now fueling power generators as well.

Looking out to 2030, we see gradual shifts in energy and technology continuing. Both the U.S. and world energy mix continue to grow more diverse, which strengthens energy security by reducing the risk from disruption to any single supply source. We will need to expand all these sources – and develop new ones – to meet future demand. New energy technologies will open up new energy sources, and new end-use technologies will reshape demand patterns, just as they have for the last 150 years. It is important to remember, however, that these shifts happen slowly, over the course of decades. Free markets, open trade, and stable legal, regulatory and tax frameworks will facilitate these positive transformations.

Change in energy use and technology development is an evolutionary process, but one that often has revolutionary impacts.










Importance of energy

Before considering the many energy demand, supply and emissions trends that constitute the world's energy outlook through 2030, it is worth reflecting on the importance of energy to all aspects of our lives.

Fundamentally, the energy outlook is about people – billions of people and their families using energy to improve their daily lives.

At a national and international level, it is the lifeblood of modern economies. For developed nations, reliable energy fuels the technologies and services that enrich and extend life. Energy powers advanced computers, improved transportation, expanded communications, cutting-edge medical equipment and procedures, and much more.

For developing nations, expanding reliable and affordable supplies of energy supports and even accelerates changes that improve and save lives. Reliable energy means expanded industry, modern agriculture, increased trade and improved transportation. These are building blocks of economic growth that create the jobs that help people escape poverty and create better lives for their children.

For these reasons and more, energy issues are vitally important and demand our understanding.



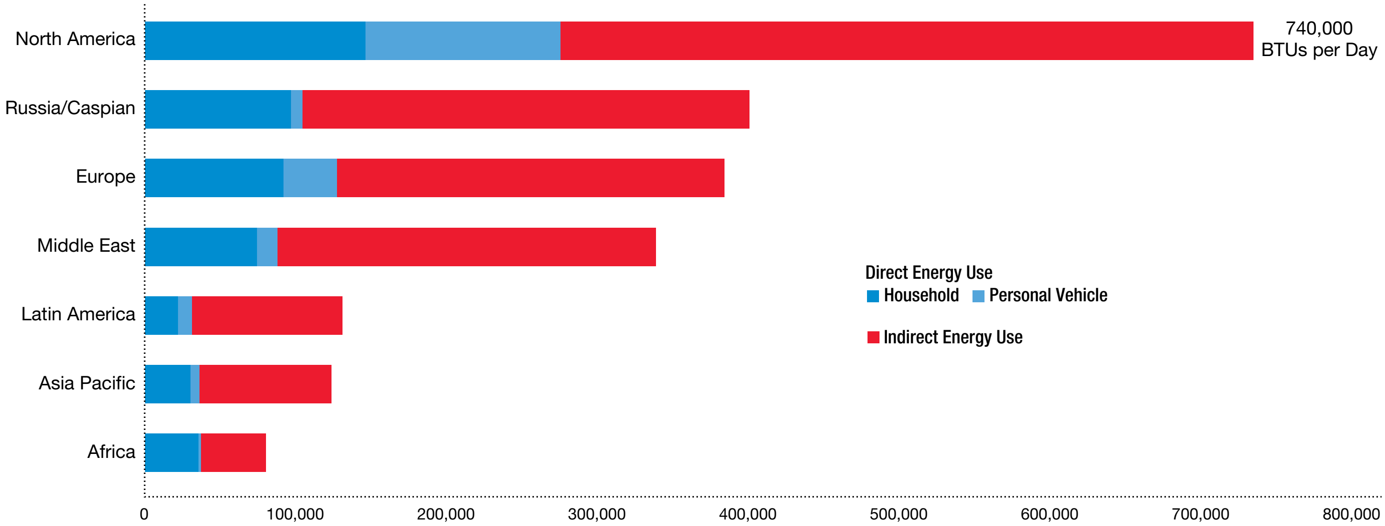





Your energy footprint

daily energy use

BTUs per Person



The benefits of energy reach far beyond what we may see in our day-to-day lives.

The energy that people use every day – to run their households and drive their cars – is what we can categorize as personal, or direct, consumption of energy, and it includes the fuel used to make electricity for the home.

To complete the picture, we also need to count the energy that powers private enterprise, public services and other important needs across society.

This indirect consumption includes energy required to run buildings (schools, hospitals, retail shops), commercial transportation (trucking, air and rail travel) and industry (manufacturing, chemicals, steel). Every member of society benefits from this indirect energy usage – through job opportunities, higher living standards and overall economic growth.

On a global, per-capita basis, indirect energy consumption is about two-thirds of the total. In other words, when direct and indirect energy consumption are counted, each of us has on average an energy "footprint" that is about twice the size of what we might typically consider our personal energy consumption.

In 2005, the average person in North America had a daily energy footprint equivalent to nearly 740,000 BTUs of energy.

The pattern of direct and indirect energy use holds true in every region of the world. While the absolute level of energy use differs, indirect use is larger in every region.

As we look at different ways to solve our energy challenges, we must consider not only the energy we use in our daily lives, but also the tremendous energy being used behind the scenes that makes our modern lives possible.

Our key energy challenges

As we survey the global energy landscape to 2030, we see several interlocking challenges.

One of the biggest jobs through 2030 will be to reduce poverty and raise living standards around the world. An important factor in achieving this goal will be to continue meeting the world's energy needs safely, reliably and affordably, even as population and economic growth – particularly in developing countries – pushes global demand higher by almost 35 percent compared to 2005.

By providing reliable and affordable energy, we will also help revitalize economies and enable broad economic gains around the world. Meeting this demand will not be easy, especially considering that the world's energy resources are increasingly found in difficult or hard-to-reach places. And it will require the global energy industry to operate on a scale even larger than it does today.

At the same time, because we want to ensure that today's progress does not come at the expense of future generations, we need to manage the risks to our climate and environment. That includes taking meaningful steps to curb carbon dioxide (CO_2) emissions, while at the same time utilizing local resources to help maintain secure supplies.

We can meet these interlocking challenges. To do it, we will need an integrated set of solutions that includes expanding all economic energy sources, improving efficiency and mitigating emissions through the use of cleaner-burning fuels such as natural gas.

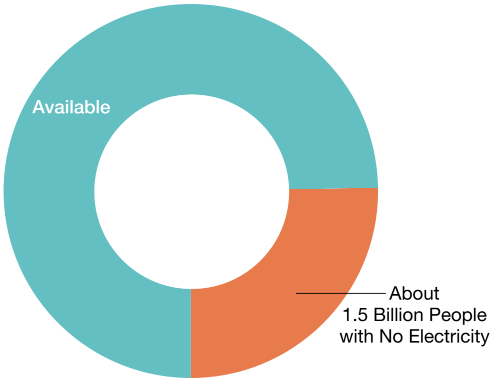
These solutions must be supported by trillions of dollars in new energy investment, a long-term focus and constant technological innovation.

ExxonMobil is committed to pursuing each of these integrated solutions.

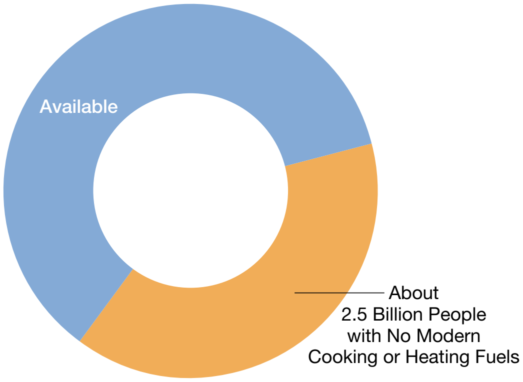
Globally, about 2.5 billion people rely on traditional fuels such as wood and dung for heating and cooking.

Challenge: meeting basic needs

electricity



modern cooking and heating fuels



Globally, about **1.5 billion people** lack access to electricity.

Over the past 150 years, the evolution of modern energy and technology has enabled people in developed countries to achieve a lifestyle in which access to energy – at home, at work and on the road – is largely taken for granted. In many of these places, the challenge today is largely one of securing enough reliable, affordable energy to continue meeting these existing needs.

But in some parts of the world, the challenge is far more basic. Today, globally, about 1.5 billion people lack access to electricity.

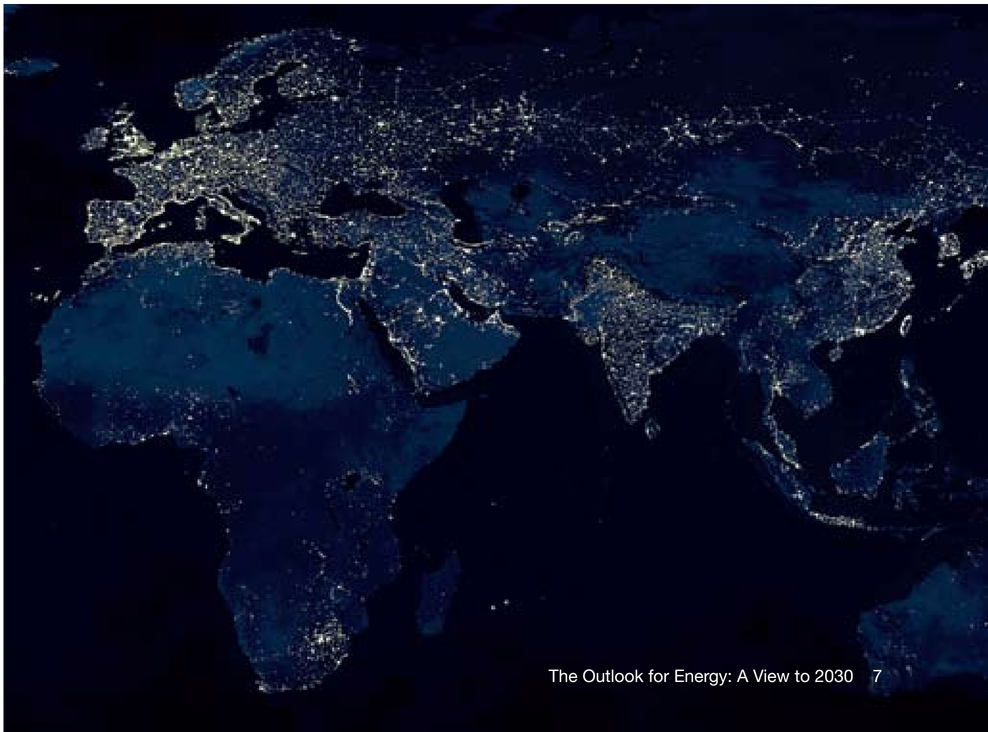
Even more live without modern fuels for cooking and heating. Instead, these 2.5 billion people – nearly 40 percent of the world's population – rely on burning wood, dung or other traditional biomass fuels, which can be dangerous to people's health and harmful to air quality.

Gaining access to energy represents hope and opportunity. It means improved transportation, increased commerce, expanded industry and greater access to health care and other social services – all of which create jobs that help people escape poverty. For nations with widespread poverty, affordable and reliable energy also is vital to building homes, schools, hospitals and sanitation systems that can improve and save lives.

As we consider the energy outlook to 2030, it is important to keep in mind this "energy gap," and energy's potential to lift lives and improve communities in developed and developing nations alike.

A satellite image of the Earth at night shows electricity usage by region.

Photo courtesy of NASA



On average, a city of 1 million people in the OECD:

Needs 6 million BTUs of energy every second

Consumes over 1,000 gallons of oil per minute

Uses 150 tons of coal each hour

Requires two world-scale power plants

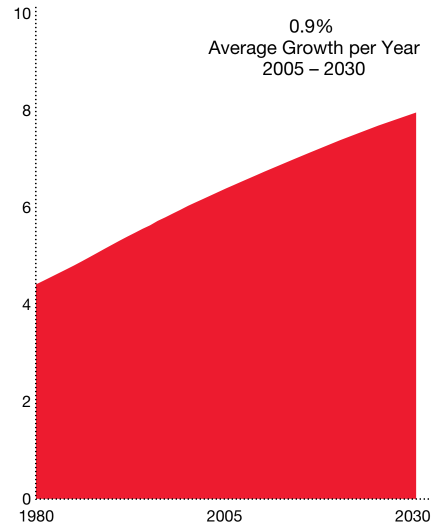
Drives 500,000 cars that use over 500,000 gallons of petroleum every day

Naples, Italy, population 1,004,500

Energy demand to grow significantly

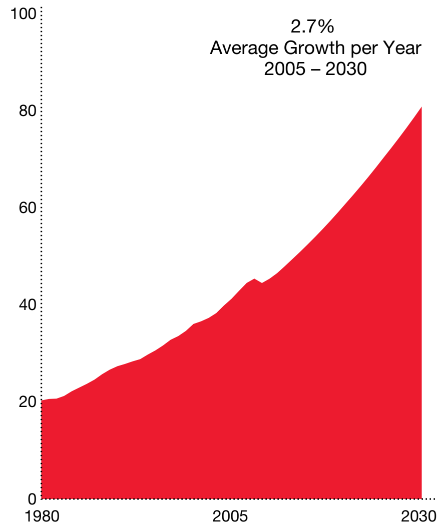
population

Billions



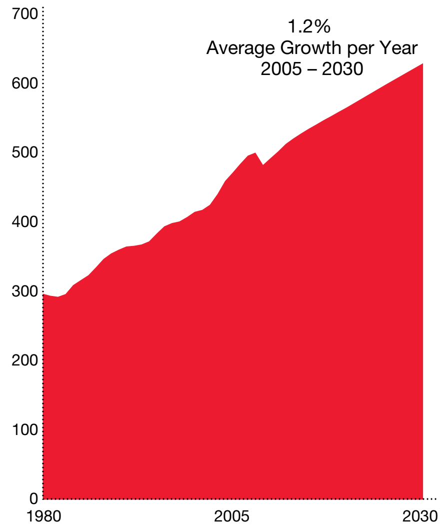
GDP

Trillions in 2005 Dollars



energy demand

Quadrillion BTUs



When ExxonMobil prepares its *Outlook for Energy* each year, we start with the world's economic outlook, because economic activity – along with population growth – is a fundamental driver of energy demand.

The economic trend, globally, is the same, and it's encouraging.

While the recession is expected to produce a 2 percent contraction in global GDP in 2009, economic growth will return, and return to a pre-recession rate. In fact, from 2005 through 2030, we see global GDP expanding at an average annual rate of 2.7 percent.

At the same time, the world's population is expected to rise from 6.7 billion today to almost 8 billion. As we noted earlier, rising populations not only create new demands for energy for personal needs such as fuels for cars and electricity for homes, but also energy that is consumed "indirectly" – the energy that serves the broader society and economy.

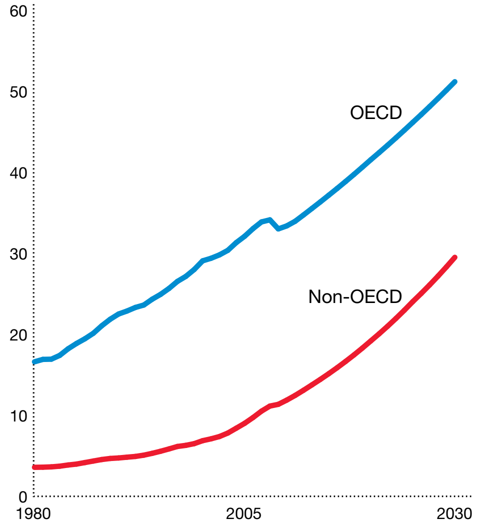
Together, population and economic growth through 2030 will continue to drive global energy demand higher.

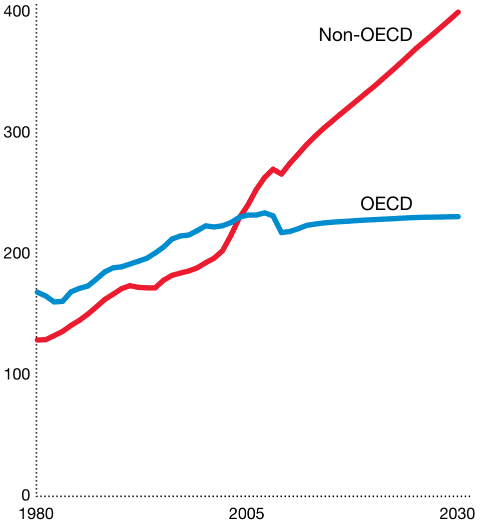
ExxonMobil expects that global energy demand will rise by an average annual rate of 1.2 percent a year through 2030, when the world will be using almost 35 percent more energy than it did in 2005. The composition of the world's energy will continue to evolve through 2030, as we will discuss later in the *Outlook*.

It's important to note that while economic growth drives energy demand, because of expected gains in energy efficiency, our projected rate of energy-demand growth (1.2 percent) is less than half the rate of global GDP growth (2.7 percent) through 2030.

In the United States and other OECD countries, energy demand will be essentially flat and CO_2 emissions will decline through 2030 even as economies and populations grow. Energy efficiency will play a key role.

Economic growth drives energy demand





Global energy demand will be almost

35%

higher in 2030

than it was in 2005.

While global energy demand is expected to rise by almost 35 percent through 2030, to fully understand the energy outlook in coming decades, we need to examine what's going on in developed Organization for Economic Co-operation and Development (OECD) countries (like the United States and European nations) and non-OECD nations (such as China and India), because the trends in these two groups can be starkly different.

Through 2030, the economies of non-OECD countries, while still relatively smaller, will grow at a much faster rate than those of the OECD. By 2030, these developing economies will have reached close to 60 percent of OECD economic output.

In non-OECD countries, rapid economic growth is expected to produce a steep climb in energy demand. **In fact, we expect that between 2005 and 2030, non-OECD energy demand will grow by about 65 percent.** However, even with this rapid growth, per-capita energy demand in non-OECD countries still will be much smaller than in OECD countries.

By contrast, in OECD countries, energy demand is expected to actually be slightly lower in 2030 versus 2005, even though their economies will be more than 50 percent larger on average.

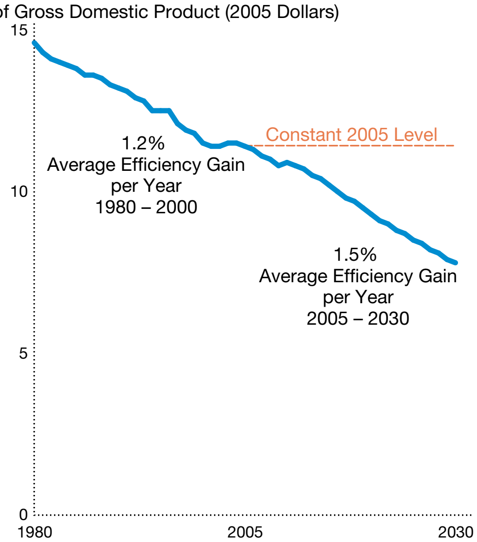
How is this possible? The main reason is efficiency. ExxonMobil continues to project substantial improvements in efficiency in OECD countries. In non-OECD countries, we also see efficiency improving, but faster growth in GDP and personal incomes will continue to drive demand higher there.

The world uses 15 billion BTUs of energy every second. As more countries move up the economic ladder, more energy will be required.

Efficiency: reducing demand growth

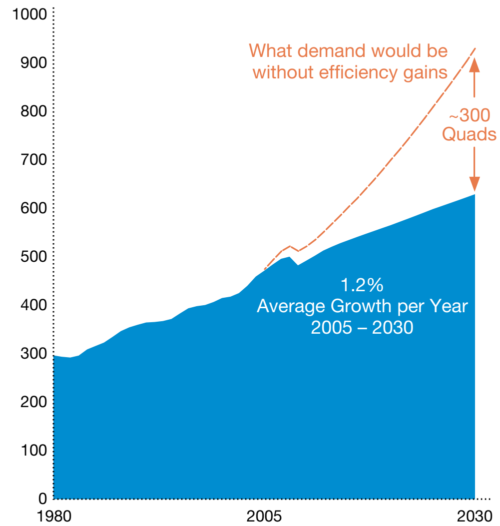
energy per GDP

Millions of BTUs per Thousand of Dollars of Gross Domestic Product (2005 Dollars)



energy demand

Quadrillion BTUs



Our world continues to become more energy efficient. From 1980 to 2000, the energy it took to produce one unit of GDP fell by an average 1.2 percent a year. This occurred for a number of reasons, including the use of new, energy-saving technologies.

We expect efficiency gains to accelerate between 2005 and 2030 versus historical trends, with energy-per-GDP falling at an average global rate of 1.5 percent a year.

This faster pace will be driven by higher energy costs, government mandates and regulations, technology advances and expected CO_2 emissions costs in OECD countries.

Improving efficiency at this rate will save a significant amount of energy.

Through 2030, ExxonMobil expects global energy demand to grow by an average 1.2 percent. To see how energy efficiency works to curb energy-demand growth, imagine if the world's economies grew as projected through 2030, but efficiency was held flat at 2005 levels. **In that case, global energy demand in 2030 would not be almost 35 percent higher** than in 2005, as we currently project; it would be about 95 percent higher. Put another way, gains in energy efficiency through 2030 will curb energy-demand growth through 2030 by about 65 percent.

In this respect, the greatest source of energy in the future is finding ways to use energy more efficiently.

Gains in energy efficiency through 2030 will reduce global energy-demand growth by approximately

65%.

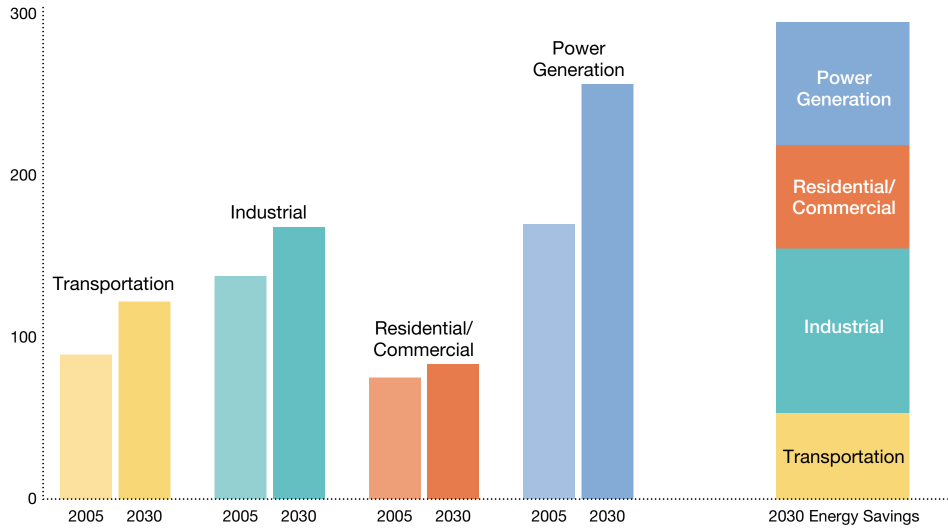
Taking sensible steps to improve energy efficiency is a "triple win" – it saves money, reduces energy demand and curbs CO_2 emissions.

Through 2030, the amount of energy saved through improved efficiency will be greater than the energy consumed from any single supply source.

Growing global demand

energy demand in each sector will increase . . .

. . . but increasing efficiencies will help mitigate growth



By 2030, power generation will account for **40%** of all energy demand.

Broken down by the four main end-use sectors, the biggest demand for energy comes from electric power generation – a fact that might surprise some people, who may think that transportation is the largest. Transportation is, in fact, in third place behind industrial demand, which represents the energy used for manufacturing, steelmaking and other industrial purposes. Residential/commercial demand is the smallest sector.

Power generation is not only the largest energy-demand sector, but also the fastest-growing. Through 2030, this sector represents 55 percent of the total growth in energy demand.

The story behind the remarkable increase in demand for energy for power generation is not just the high-tech demands of the developed world, but also the more basic needs and economic growth of the developing world. Non-OECD electricity demand more than doubles through 2030 and accounts for 80 percent of total growth in electricity demand through 2030.

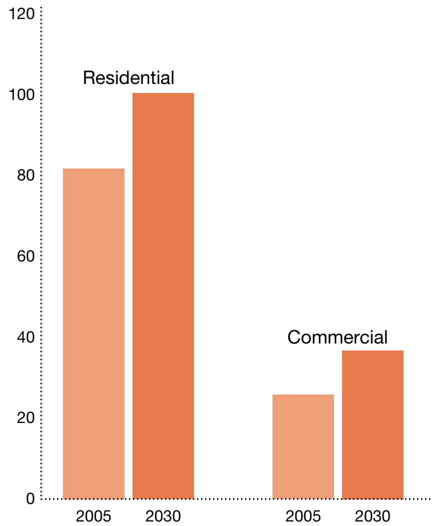
Anyone asking how the world will meet its energy and environmental goals must consider electric power generation; by 2030, this sector alone will account for about 40 percent of total primary energy demand, and its largest energy source will continue to be coal, the fuel with the highest carbon intensity.

In each sector, demand would be growing much faster without improvements in efficiency. Efficiency improvements in each sector will add up to significant energy savings each year – reaching 300 quadrillion BTUs in 2030.

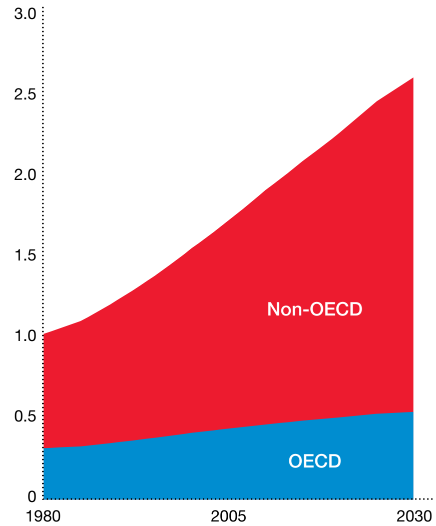
Rising living standards in non-OECD countries will create new demands for energy through 2030.

Residential/commercial demand

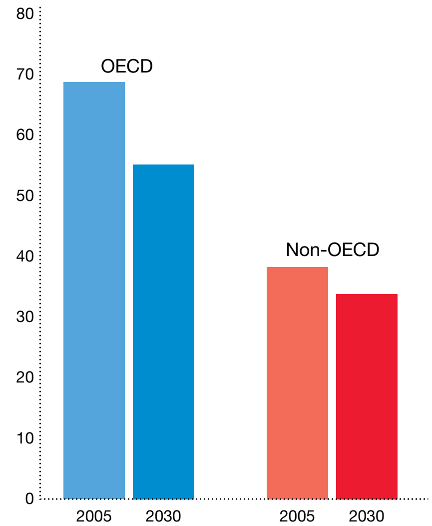
by sector
Quadrillion BTUs



residential
Billion Households



residential energy use
Millions of BTUs per Household



In the residential/commercial sector – the energy we use in our homes and businesses – residential demand dominates, at about three times bigger than commercial. This trend continues as demand in this sector grows through 2030.

Residential energy demand is tied closely to the total number of households in the world. Through 2030, we see the number of households rising by 900 million, with nearly 90 percent of that growth occurring in non-OECD countries.

OECD countries today use substantially more energy per household than non-OECD countries. While that remains true in 2030, all around the world, households are growing more efficient in their use of energy. Through 2030, the steepest decline in energy-per-household will come from OECD countries, with more modest rates of improvement in non-OECD nations.

A diverse mix of energy is used to meet residential/commercial demand. Natural gas and electricity account for most of the growth in this sector through 2030. But biomass – fuels like wood and dung – will retain a substantial share of supply, mainly in the non-OECD.

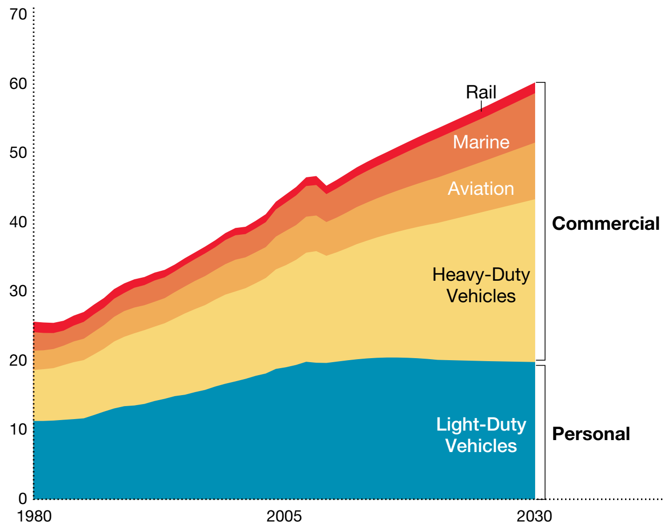
Note: In each sector, we have included "electricity" in the breakdown of demand by fuel. Electricity, of course, is not a fuel in itself – it must be generated by other energy sources such as coal and natural gas. But it is important to recognize the share of total electricity that is consumed by each end-use sector.

There will be 900 million more households in the world by 2030 – and they will need energy for heating, cooking and appliances.

Global transportation demand

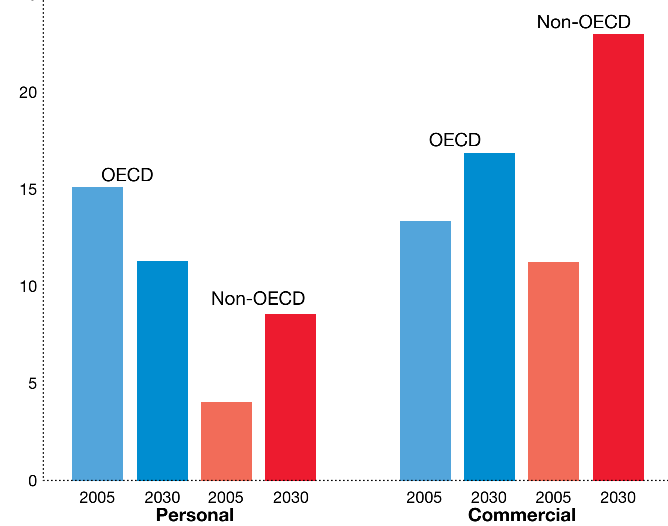
by sector

Millions of Oil-Equivalent Barrels per Day



personal vs. commercial

Millions of Oil-Equivalent Barrels per Day



Transportation is one of the fastest-growing energy demand sectors. It is also the one associated most closely with oil. While, for example, we can use many different fuels to make electricity, the same is not true right now for transportation; globally, 98 percent of transportation runs on fuel made from oil.

Historically, light-duty vehicles – cars, SUVs and light pickup trucks – have been the largest sub-sector, but that is changing.

Through 2030, light-duty demand flattens as more efficient vehicles enter the market. Heavy-duty vehicles (trucks and buses) grow the most, the result of a number of factors, including economic growth and the increased shipment of goods across and between nations, and within local communities.

By 2030, heavy-duty vehicles will have become the largest transportation demand segment; aviation and marine transport also grow significantly, reflecting global economic links.

We can classify transportation into two basic categories – personal and commercial. In both, but especially in personal vehicles, energy demand is higher in OECD countries today.

But through 2030, we see a significant shift. In the OECD, personal transportation demand is expected to drop by 25 percent through 2030, while non-OECD demand more than doubles. Why is this? First, vehicle ownership is closely tied to personal income, and in OECD economies, vehicles-per-capita is already high. So, better fuel economy over time – enabled by greater penetration of conventional and advanced technologies across the fleet – will more than offset additional demand created by an increase in vehicles per capita. But in non-OECD countries, economic progress will be accompanied by rapid growth in vehicle ownership through 2030.

Commercial transportation demand will grow in all regions, but far more rapidly in non-OECD countries. By 2030, these fast-developing nations will have overtaken the OECD as the largest source of commercial transportation demand.

Heavy-duty vehicles such as commercial trucks will soon overtake personal vehicles as the largest source of transportation-related energy demand.

A single-cell oil well?

ExxonMobil believes that **biofuels from photosynthetic algae** could someday play an important role in meeting the world's growing need for transportation fuels, while also reducing CO_2 emissions.

In July 2009, we announced a significant new project to research and develop algae biofuels. Our partner is Synthetic Genomics Inc (SGI), a California-based biotech firm founded by genome research pioneer Dr. J. Craig Venter. The goal of the program: to produce **a commercially scalable, renewable algae-based fuel** compatible with today's gasoline, diesel and jet fuel.

- **Why algae?** Scientists already know that certain algae naturally produce oils similar to the petroleum products we use today. If commercial quantities of these algae-based oils could be developed, they could avoid the need to build the extensive new delivery infrastructure that some other alternative transportation fuels might require.

- **Algae-based biofuels have potential environmental advantages.** Through photosynthesis, algae absorb CO_2 – the main greenhouse gas – and convert it to useful products, like oils and oxygen. As a result, fuels made from algae could reduce greenhouse gas emissions.

- **Algae-based biofuels likely would not impact the global food supply.** While biofuels made from plants like corn and sugar cane are an expanding energy source, they require fertile land and fresh water; algae can be grown using land and water unsuitable for plant or food production. Algae also could yield between three and eight times more biofuel per acre compared to other biofuel sources.

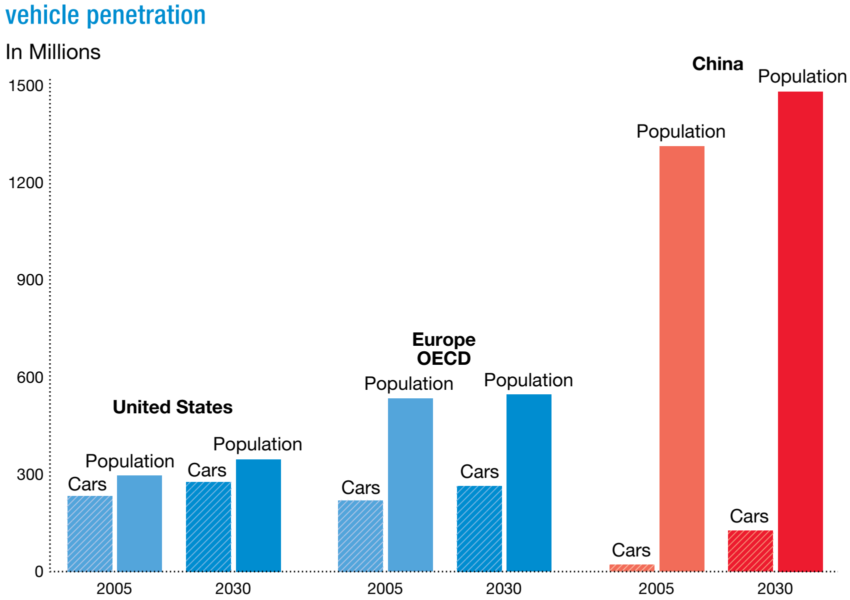
Getting these algae fuels from the lab to broad, commercial scale at the local gas station will be a tremendous undertaking – and **could require decades of work**.

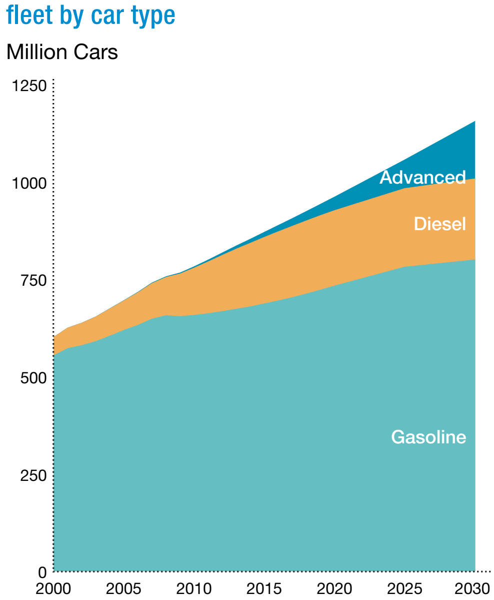
It is an exciting project that brings together SGI's expertise in genomics, synthetic biology, microbiology and biochemistry; and ExxonMobil's expertise in transportation fuels and the development of technologies and systems needed to increase scale from concept phase to large-scale manufacturing.

ExxonMobil expects to spend more than $600 million on this project if research and development milestones are met.

ExxonMobil's investment in algae-based fuels is just one part of our commitment to the breakthrough technologies and integrated solutions that will be needed to address rising demand for transportation fuels and other long-term challenges illustrated in our *Outlook for Energy*.

Personal vehicle fleet is growing





To accurately estimate future demand for light-duty transportation fuels, we need to project the number of vehicles that will be on the world's roads in 2030, and the types of fuels they will use. Personal transportation demand is very sensitive to vehicle fleet size, which we forecast from income levels and vehicle penetration.

In the United States, vehicle penetration – the number of vehicles relative to population – is quite high, at nearly 80 percent, reflecting the strong correlation between income and vehicle ownership.

Europe has a larger population than the United States but a similar fleet size, reflecting a much lower number of vehicles per capita.

The picture in other areas can be very different. For example, in China, rising incomes will result in rapid growth in that country's personal-vehicle fleet through 2030. Yet even in 2030, China's vehicles-per-capita will be almost 10 times lower than the United States', with about eight vehicles for every 100 people.

At the same time, the composition of the global vehicle fleet is expected to change through 2030. Conventional gasoline vehicles will continue to be the majority, followed by diesel. Hybrids and other advanced vehicles will grow rapidly; we estimate that by 2030 they will constitute approximately 15 percent of the total personal-vehicle fleet, compared to less than 1 percent today.

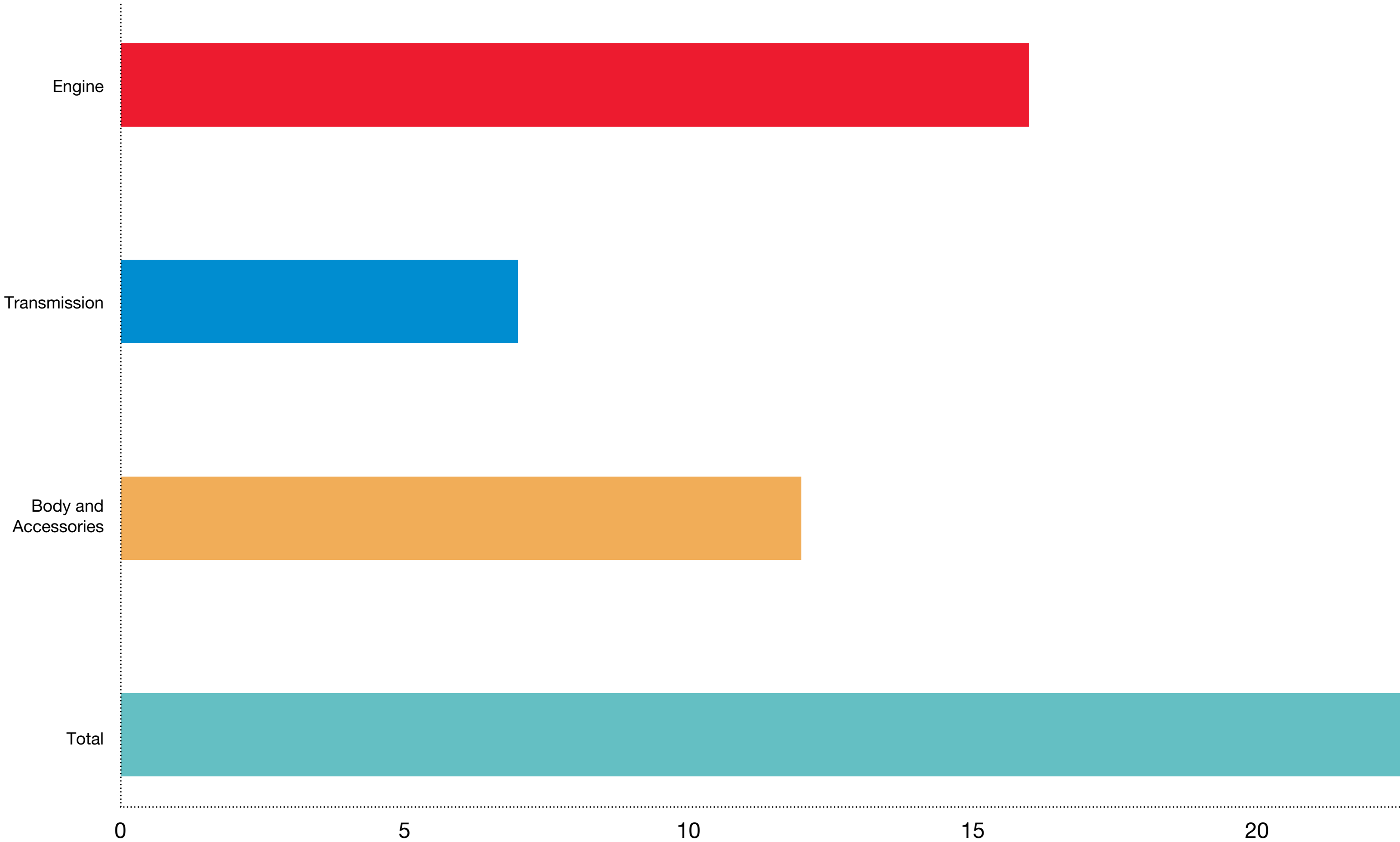
The expanding market share of hybrids and other advanced vehicles, combined with ongoing improvements to the fuel efficiency of conventional vehicles, will combine to curb growth in energy demand for transportation through 2030.

China today has only about 27 vehicles per 1,000 people, compared to 780 per 1,000 in the United States. Rising incomes in China and other developing countries will produce strong growth in the number of global vehicles through 2030.

Improving today's vehicle

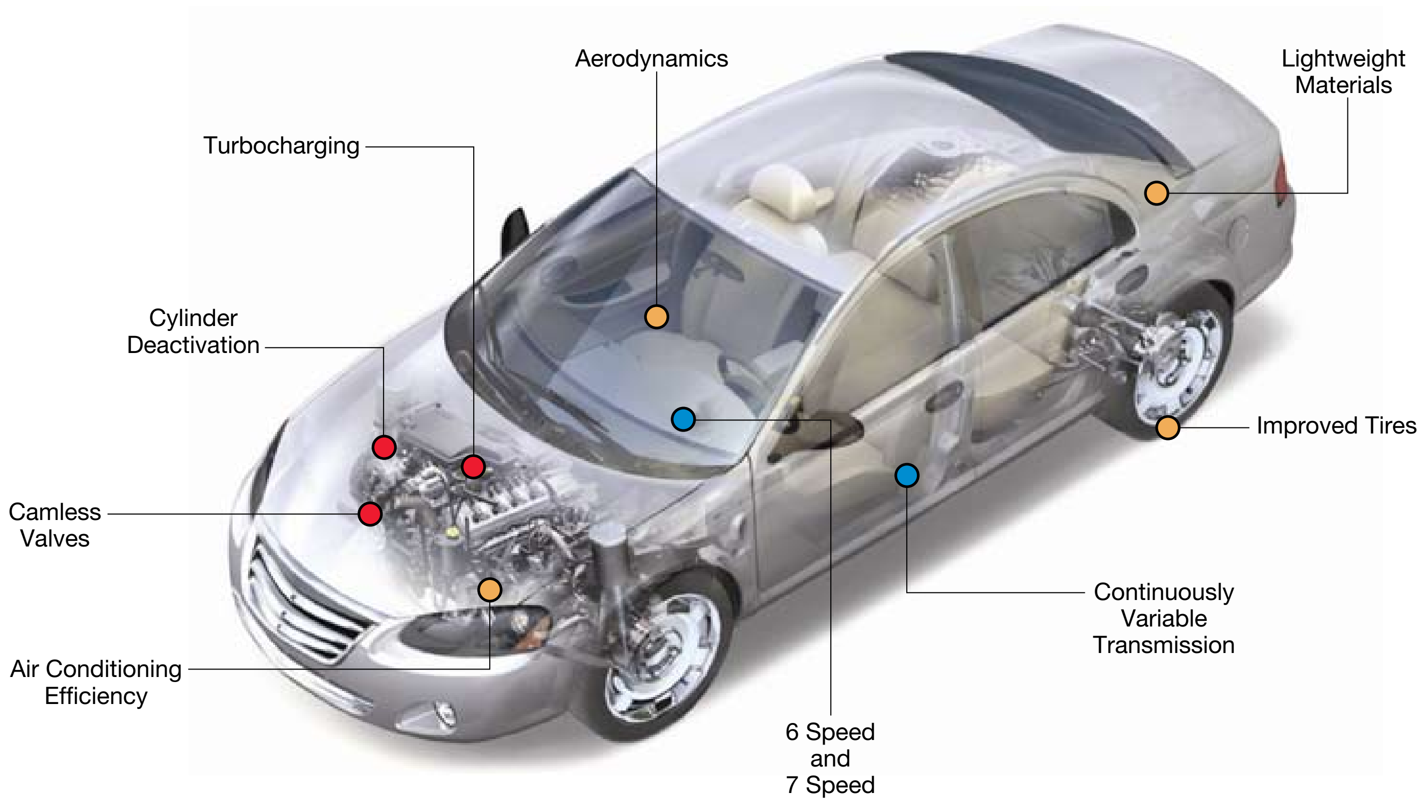
improvement in mileage

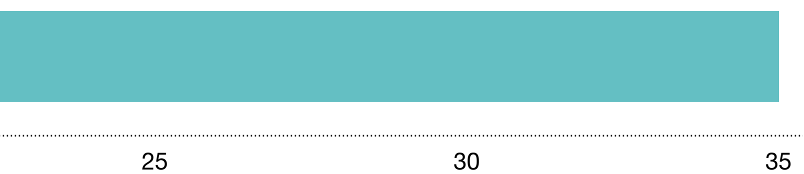
Percent Improvement in Miles per Gallon



Making vehicles more efficient is a goal of automakers, governments and consumers around the world. Many technologies already have been developed to substantially improve the fuel efficiency of conventional vehicles. These are not far-off innovations; they are available today, and there is a lot of positive news in this area.

- Improved engine-based technologies can increase miles per gallon by about 15 percent versus today's conventional gasoline vehicles. For example, engines can be made more efficient via turbocharging, cylinder deactivation and camless valves.
- For transmissions, increasing to a 6-speed or higher transmission, or to a continuously variable transmission, could increase miles per gallon by another 5 percent to 10 percent.
- Potential improvements to the car body and accessories include improving vehicle aerodynamics and reducing vehicle weight through lightweight materials such as plastics. They also include tires that stay inflated longer and higher-efficiency air-conditioner compressors. Together, these technologies could produce a 10 percent to 15 percent improvement in fuel efficiency.



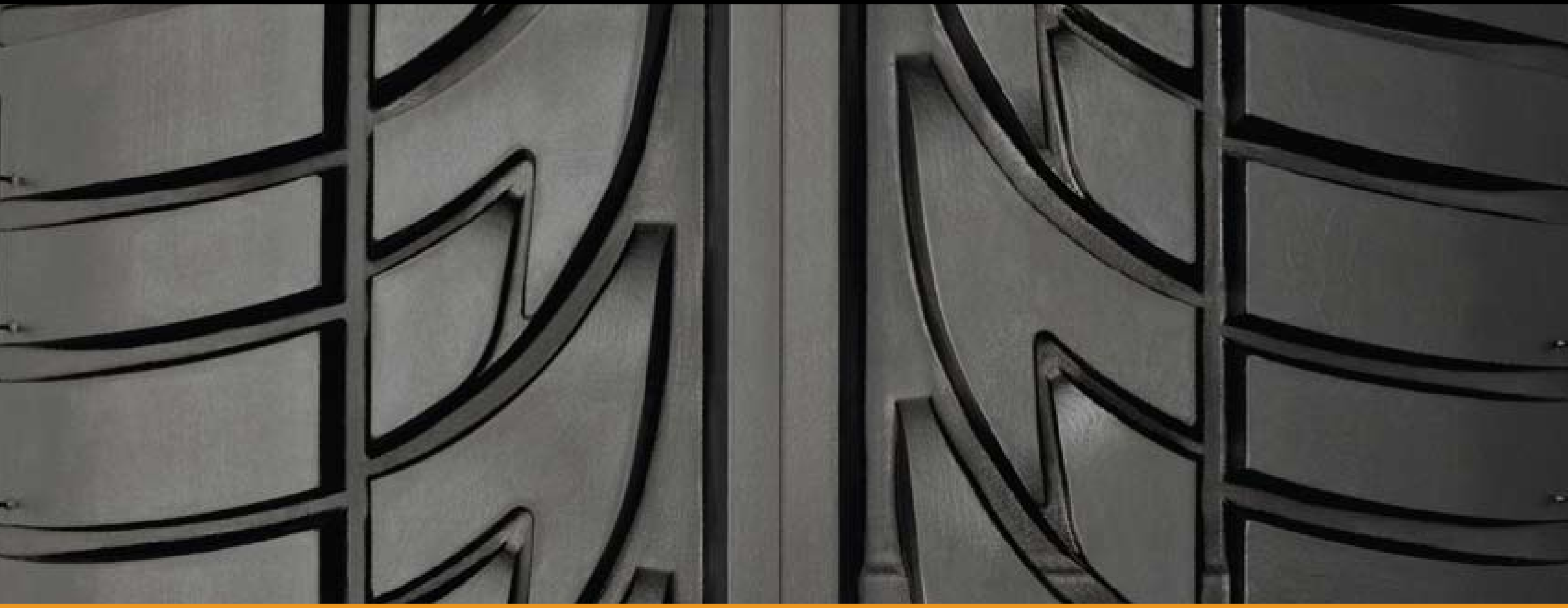


When we combine all these improvements to conventional vehicles, we see an overall potential increase in miles per gallon of about 35 percent.

While these technologies are available today, some have not yet been widely utilized because of cost or other issues. We expect, however, that this will change as automakers seek to ramp up fleet efficiencies to meet mandates.

Our view is that compared to hybrids, plug-in hybrids or electric vehicles, improvements to conventional vehicles will likely be a more cost-effective approach for improving light-duty vehicle efficiency through 2030. It's a matter of affordability and scale – making incremental and economical improvements to the millions of conventional cars that make up the vast majority of new-car sales is expected to have a greater overall impact than revolutionary and costly changes in new cars with technologies that as of yet have not proven capable of significantly penetrating the market.

Thinking outside the tank



ExxonMobil's interest in cars and trucks goes far beyond the fuel tank. Using our expertise not only in fuels and lubricants, but also in chemicals and plastics, we are advancing **new technologies to make vehicles more fuel efficient**. Conventional vehicle efficiency improvements will be a key in reducing the demand for personal transportation fuel demand in the OECD by 2030.

Some of our technologies are already on the road. For example:

- Working with major tire manufacturers, ExxonMobil developed a **new tire-lining technology** that uses up to 80 percent less material in the manufacturing process, making tires lighter and keeping them properly inflated. A car with under-inflated tires burns up to an extra tank of gasoline every year.

- ExxonMobil has developed **lightweight plastics** for car parts such as bumpers and fuel tanks. Lighter vehicles use less fuel; for every 10 percent drop in vehicle weight, fuel economy improves by 7 percent. ExxonMobil is a leading supplier of polyolefinic polymers used in the manufacture of plastic car parts.

- We introduced **Mobil 1 Advanced Fuel Economy**, a lower-viscosity synthetic motor oil. Lower viscosity means less energy is required to circulate the oil in the engine. Mobil AFE can improve fuel economy by up to 2 percent versus motor oils most commonly used.

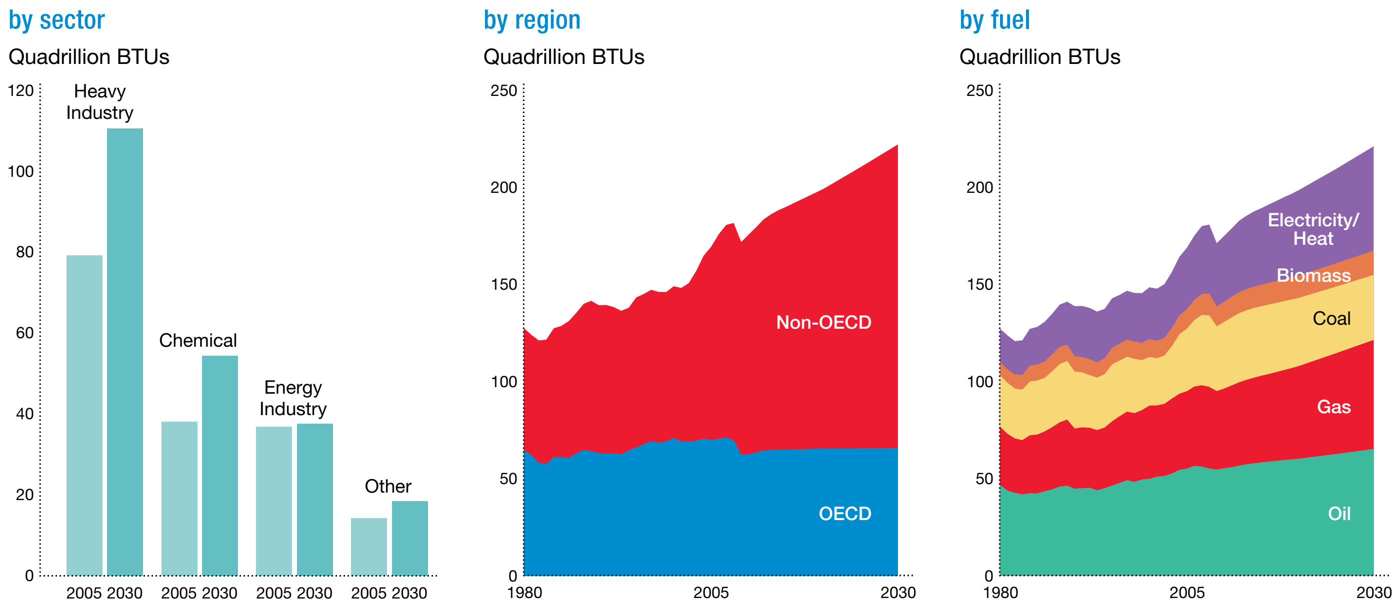
These ExxonMobil technologies may not get much notice from drivers, but they can **add up to significant fuel savings**. For example, if all vehicle tires on the road in the United States retained air pressure as well as tires made with our new technology, it would save more than 700 million gallons of fuel annually.

By enabling cars and trucks to travel farther on a gallon of fuel, drivers not only **spend less money** per mile, they also **emit less CO_2** per mile.

Reducing emissions associated with transportation is one of the key long-term challenges outlined in *The Outlook for Energy*. In the United States, transportation accounted for 33 percent of all energy-related CO_2 emissions in 2008, second only to electric power generation, according to the Department of Energy.

In addition to technologies available today, ExxonMobil also is researching **advanced engine technologies** that could make the internal-combustion engine more efficient, and developing innovations that could advance hybrid and hydrogen-powered vehicles.

Global industrial demand



The industrial sector is the second-largest demand sector, behind power generation. In 2005, it accounted for nearly 30 percent of global energy usage.

Heavy industry and chemicals make up the majority of industrial demand. These two sub-sectors will account for 90 percent of the growth in industrial demand through 2030, which is the result of economic expansion, concentrated in non-OECD countries.

The next largest sub-sector is the energy industry. Here, energy usage stays about flat through 2030, even as demand for the industry's products is projected to grow substantially. This achievement is the result of ongoing efficiency improvements throughout the industry and a reduction in natural gas "flaring."

Broken down by country group, industrial energy demand increases by nearly 60 percent in non-OECD countries from 2005 to 2030, with China making up about 35 percent of that increase. This is consistent with the robust economic growth and continued industrialization of the developing world.

Meanwhile, OECD industrial energy demand is projected to be down slightly from 2005 to 2030, despite a near-term recovery in demand following the recession. This decline will be driven by several factors: relatively mature economies, ongoing efficiency gains and a decline in heavy manufacturing as a percentage of OECD economies.

Broken down by energy type, oil remains the largest industrial fuel through 2030 due to growing non-OECD demand. We see natural gas and electricity gaining share while coal declines, reflecting the shift to less-carbon-intensive energy sources.

Managing emissions

ExxonMobil is successfully **reducing emissions from its own operations**. In 2008, we achieved a global reduction of 10 million metric tonnes of greenhouse gas emissions – about a 7 percent decline from 2007.

We reduce emissions by increasing efficiency in our day-to-day operations, using new energy efficiency technologies and reducing flaring.

- **Efficiency.** Since the launch of our *Global Energy Management System* in 2000, ExxonMobil has identified opportunities to improve efficiency by 15 percent to 20 percent at our refineries and chemical plants. We have already implemented about 60 percent of these. Over the past several years, efficiency at our refining and chemicals operations has improved at a rate two to three times faster than the industry average.

- **Cogeneration.** ExxonMobil continues to expand its use of cogeneration – a process in which we produce electricity to power our operations while also capturing heat to make steam needed to transform raw materials into consumer products. ExxonMobil is an industry leader in this highly efficient form of energy production, with interest in about 100 cogeneration facilities in more than 30 locations worldwide. In 2008, we added 125 megawatts of power capacity, with the startup of new facilities at our refinery in Antwerp, Belgium. With new facilities under construction, we expect to increase our cogeneration capacity to more than 5 gigawatts by 2011.

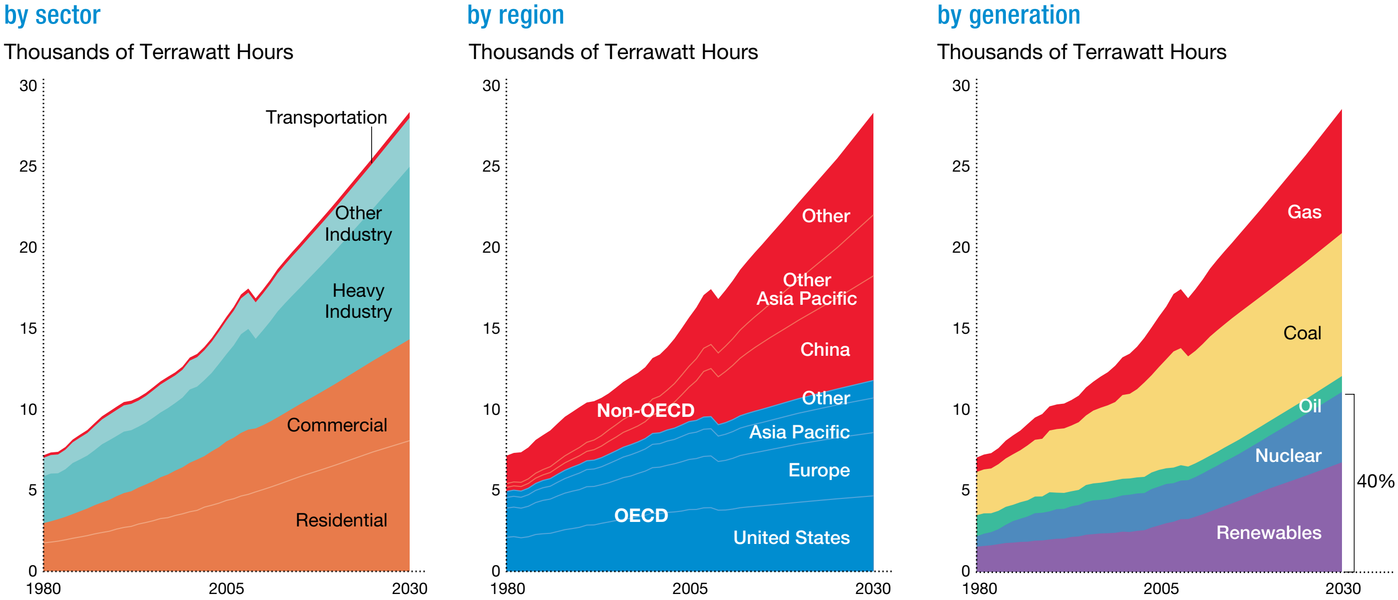
- **Flare Reduction.** Across our operations, we are working to reduce flaring of gas that has no economic outlet as well as gas that is flared as a result of maintenance or unexpected operating events. In 2008, we reduced upstream flaring by about 30 percent, and we plan further reductions of more than 20 percent over the next several years compared to 2008 levels.

Since 2004, we have invested **more than $1.5 billion** in activities to increase efficiency and reduce emissions. We plan to spend at least $500 million more over the next few years.

ExxonMobil believes that energy efficiency is the most powerful tool for meeting the central challenge outlined in *The Outlook for Energy*: how to meet rising demand for energy while also reducing the impact of energy use on the environment.

In addition to improving efficiency and reducing emissions at our own operations, ExxonMobil also is **developing technologies to help consumers do the same**. This is important because while about 10 percent of petroleum-related greenhouse gas emissions are from industry operations, 90 percent are from consumer use of petroleum.

Electricity use is growing rapidly



Growing demand for electricity, and the fuels used for power generation, is a major trend of the last 25 years, and will remain so for the next 25 years as living standards continue to improve worldwide and more people gain access to electricity.

Power generation is the largest energy-demand sector and the fastest-growing – rising at an average of approximately 1.7 percent a year – and will account for about 40 percent of all energy demand, up from 36 percent in 2005 and 26 percent in 1980. This will support strong increases in global electricity demand, which will be about four times higher than 1980.

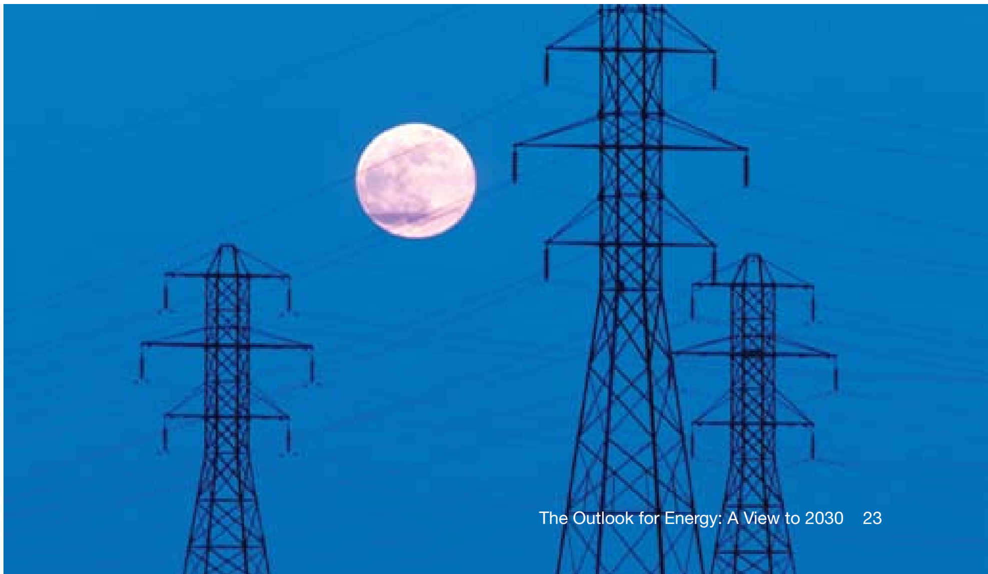
Electricity demand rises at a much faster rate in non-OECD countries, reflecting their faster economic growth and relatively low electricity penetration to date.

What fuels will be used to generate this electricity? Through 2030, there is a shift away from coal toward natural gas, as well as to nuclear and renewable fuels. This will be driven by environmental policies, including ones that seek to reduce emissions by putting a cost on carbon emissions.

By 2030, we expect that 40 percent of the world's electricity will be generated by nuclear and renewable fuels.

Projecting the future mix of fuels for power generation is a complex task with many variables. As part of this process, we must consider how these fuels will compete economically, because these are the real-life factors that utilities and power generators look at when considering which fuels to use or what types of new power plants to build.

By 2030, about 40 percent of the world's electricity will be generated by nuclear and renewable fuels.

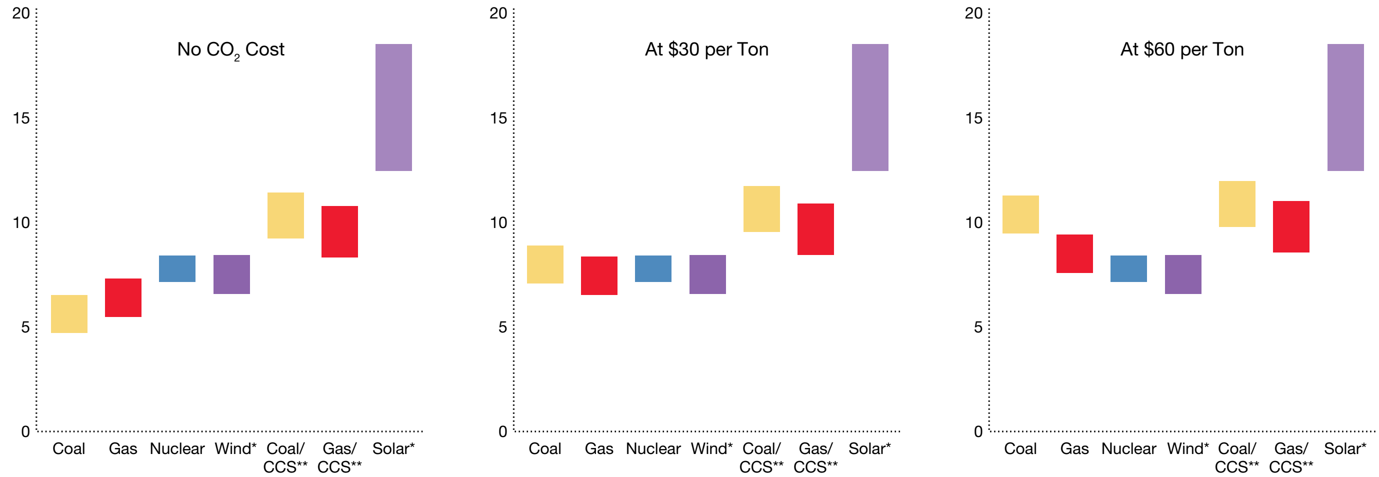


Electricity generation cost

U.S. baseload plants, startup 2025

Baseload plants are electric power plants that run continuously to meet minimum electricity demand requirements, while peaking power plants run intermittently to meet seasonal and daily peak electricity demand.

Cost per Kilowatt Hour in 2009 Cents



* Wind and solar exclude additional costs for intermittency and transmission investments ** With carbon capture and storage technology

In the United States, absent any policies that impose a cost on CO_2 emissions, we would expect coal and natural gas to be the lowest-cost options for future, new-build power plants.

But policies that impose a cost on carbon would sway these economics. Coal, being the most carbon-intensive fuel, would increase in price more than natural gas. At $30 per ton of CO_2, natural gas would become the most economic alternative for new-build power plants. This is where we expect CO_2 costs may evolve over the next 10 years.

As the CO_2 price increases, we would expect to see fuel switching from coal to natural gas. This will happen by running existing natural gas plants at higher load factors, as well as by building new natural gas plants and retiring old coal plants.

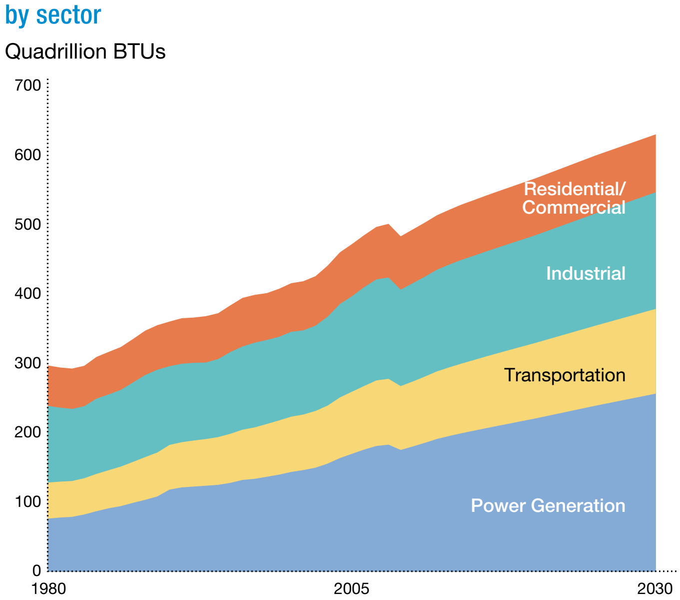
At $60 per ton, natural gas is still very competitive. In addition, nuclear and wind are now competitive, which is why we include strong growth for both in our *Outlook*.

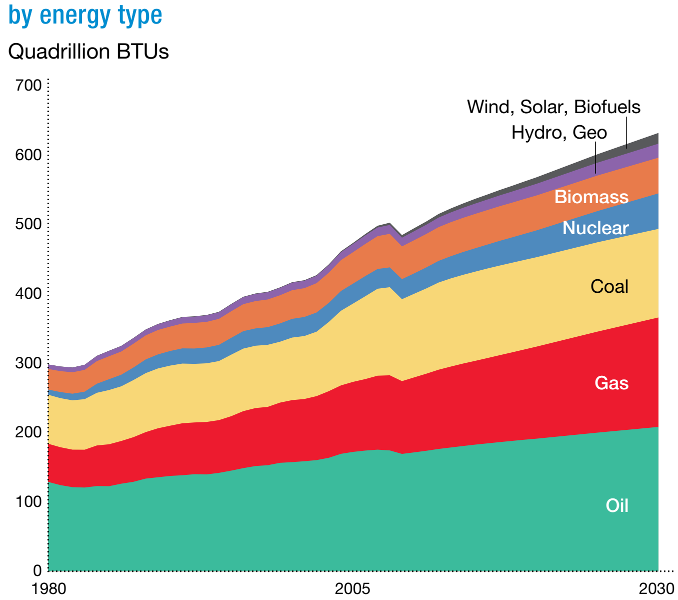
Carbon capture and storage (CCS), a process in which CO_2 emissions are captured before they can enter the atmosphere, holds promise in the future. However, even with CO_2 emissions priced at $60 per ton, new-build plants with CCS remain challenged and very expensive – meaning a less affordable source of electricity for consumers. This high cost, combined with the need to build a regulatory framework for CO_2 storage, presents significant challenges for its use over the next two decades beyond government-subsidized demonstration projects.

Likewise, solar energy faces significant hurdles to becoming economically competitive in this time frame. The cost of capturing solar energy in photovoltaic cells or concentrators remains generally unaffordable for large, commercial applications.

Climate policies that put a "cost" on CO_2 emissions will shift the economics of fuels used for power generation. Natural gas, nuclear and wind stand to benefit.

Global energy demand and supply





Through 2030, the global energy-demand picture is clear: Expansion and progress, particularly in non-OECD countries, will boost the need for energy in all four end-use sectors – power generation, transportation, industrial and residential/commercial. Even assuming significant gains in efficiency, this will stack up to a significant increase in global energy demand to 2030 – an average 1.2 percent a year.

What types of supplies will we use to meet this rising need for energy through 2030?

Fossil fuels – oil, natural gas and coal – will continue to meet most of the world's needs during this period, because no other energy sources can match their availability, versatility, affordability and scale. **The fastest-growing of these fuels will be natural gas, because it is the cleanest-burning. By 2030, global demand for natural gas will be more than 55 percent higher than it was in 2005.** Nuclear power will also grow significantly to support increasing needs for power generation.

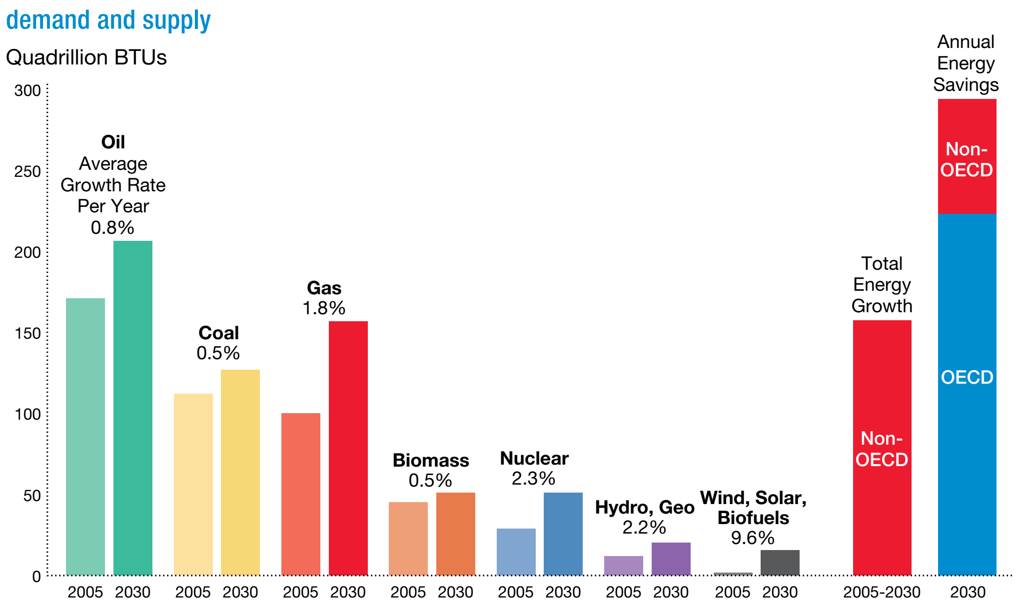
Wind, solar and biofuels will grow sharply through 2030, at nearly 10 percent per year on average. However, because they are starting from a small base, their contribution by 2030 will remain relatively small at about 2.5 percent of total energy.

No single fuel can meet our energy challenges. To satisfy projected increases in global energy demand to 2030 – and ensure reliable and affordable energy to help meet our interlocking social, economic and environmental challenges – we will need to expand all economic fuel sources through 2030.

Technology will play a key role. Many do not realize that energy already is a high-tech industry. New innovations and improvements in energy technology continue to advance the potential for all sources of energy.

ExxonMobil scientists and engineers use 3-D seismic technology to locate oil and natural gas deposits with greater accuracy and a smaller environmental footprint.

Global energy demand and supply



Oil and natural gas remain essential through 2030, but one of the most important "fuels" of all will be energy saved through improved efficiency.

Today, fossil fuels provide the majority of the world's energy, led by oil and then coal and natural gas. Biomass and nuclear come next, followed by hydroelectric and geothermal power. Wind, solar and biofuels combine for a very small share.

In 2030, fossil fuels remain the predominant energy sources, accounting for nearly 80 percent of demand. Oil still leads, but natural gas moves into second place on very strong growth of 1.8 percent a year on average, particularly because of its position as a favored fuel for power generation.

Other energy types – particularly nuclear, wind, solar and biofuels – will grow sharply, albeit from a smaller base.

Other reputable sources, including the U.S. Government's Energy Information Administration and the International Energy Agency, share a similar view of this supply picture.

Total global energy demand through 2030 is expected to rise by about 160 quadrillion BTUs. All of this growth will occur in non-OECD countries; OECD demand is expected to be slightly lower in 2030 versus 2005.

Through 2030, one of the most important "fuels" of all will be energy saved through improved efficiency. **Energy saved through efficiency gains will reach about 300 quadrillion BTUs per year by 2030, which is about twice the growth in global energy demand through 2030.** Most of the energy saved through efficiency will be in OECD countries.

ExxonMobil has partnered with the National Community Action Foundation to help low-income Americans save money and energy by weatherizing their homes through the U.S. Department of Energy's Weatherization Assistance Program.

The importance of natural gas

Natural gas will provide a growing share of the world's energy through 2030. Affordable and abundant, natural gas can help provide the energy needed for economic and social progress. And because it burns cleaner than oil and much cleaner than coal, natural gas is a powerful tool for reducing the environmental impact of energy use.

ExxonMobil produces more natural gas than any other public company in the world. We also **develop breakthrough natural gas technologies** that make more of this cleaner-burning fuel available to consumers around the world.

In the United States, ExxonMobil technologies have **unlocked vast new resources** of natural gas that previously were trapped in dense rock formations, as well as other types of so-called "unconventional" natural gas. These technologies have resulted in a **significant upswing in U.S. natural gas production**, and may have similar applications in other parts of the world.

- Our **Multi-Zone Stimulation Technology** (MZST) allows operators to create fractures in reservoir rock at a more rapid rate than conventional technology so gas can flow more easily. Using MZST and our Fast Drill Process, ExxonMobil is increasing recovery and production rates while reducing development costs and our environmental footprint.

- ExxonMobil has joined with Qatar Petroleum and other partners to further develop Qatar's North Field, **the largest non-associated natural gas field in the world**. There, we plan to develop natural gas resources exceeding 150 trillion cubic feet, which will serve a global customer base.

Liquefied Natural Gas (LNG): ExxonMobil is a global leader in developing and delivering advanced LNG technologies. These breakthroughs are creating a "global gas market" that can link the world's largest natural gas reserves, such as those in Qatar, with consumers who need them.

- ExxonMobil helped pioneer a **new class of LNG carriers**. These ships, called Q-Max, can carry up to 80 percent more cargo than conventional LNG carriers, reducing transportation costs while improving efficiency and reducing emissions.

- We are building state-of-the-art LNG receiving terminals in the United States and Europe. In 2009, off the coast of Italy, we opened the **world's first offshore gravity-based structure** for unloading, storage and re-gasification of LNG. The terminal's main structure rests on the seabed in 95 feet of water, about 10 miles offshore, and out of sight of land.

- ExxonMobil, together with its partners, is producing nearly 35 million tons per year of LNG. We anticipate increasing our joint production to almost 65 million tons per year by 2010. And beyond 2010, we expect this to go up to **around 100 million tons per year**.

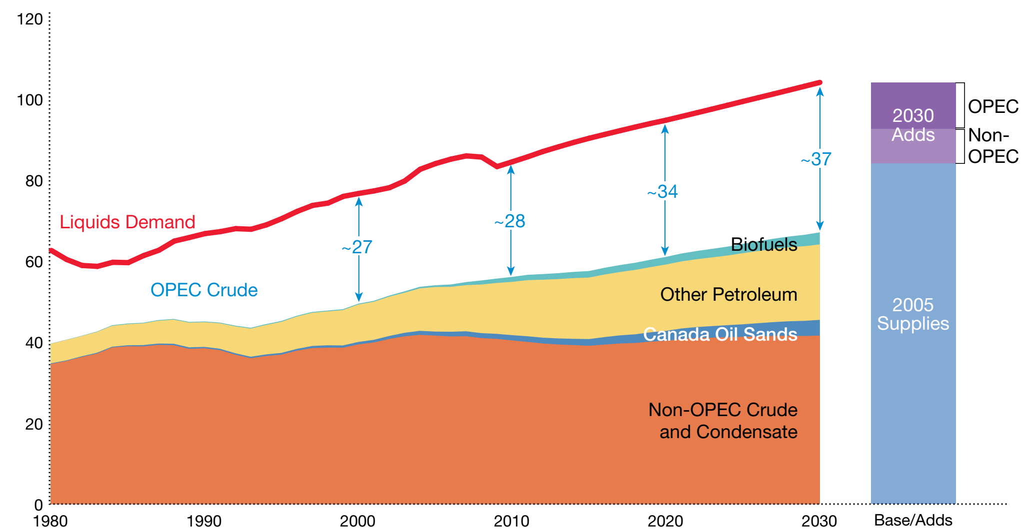
The most significant single use of natural gas is as a fuel to make electricity. As *The Outlook for Energy* shows, the world's need for electricity – and the fuels used to produce it – will grow substantially over the coming decades. **Natural gas can help meet this growing need for electricity.**

Natural gas used for electricity can **reduce CO_2 emissions by up to 60 percent** versus coal, which today is the most popular fuel for power generation. It also has fewer emissions of sulfur oxides and nitrogen oxides.

Global liquids supply grows

global liquids supply and demand

Millions of Oil-Equivalent Barrels per Day



Through 2030, OPEC and non-OPEC sources will combine to meet an expected

24%

increase

in liquid fuels demand.

The world's liquid fuel supply consists mostly of crude oil, but also includes condensate, natural gas liquids and biofuels. Liquid fuels will be especially important for meeting projected strong growth in transportation demand through 2030. Nearly all the world's transportation runs on liquid fuels because they provide a large quantity of energy in small volumes, making them easy to transport and widely available.

Through 2030, total liquids demand increases steadily to 104 MBDOE – about 24 percent higher than in 2005.

To meet this demand, non-OPEC supplies are projected to grow to about 67 MBDOE, including about 3 MBD from biofuels. Gains also are expected in "other" non-OPEC petroleum, which includes natural gas liquids, condensate, gas-to-liquids, coal-to-liquids and refinery gains.

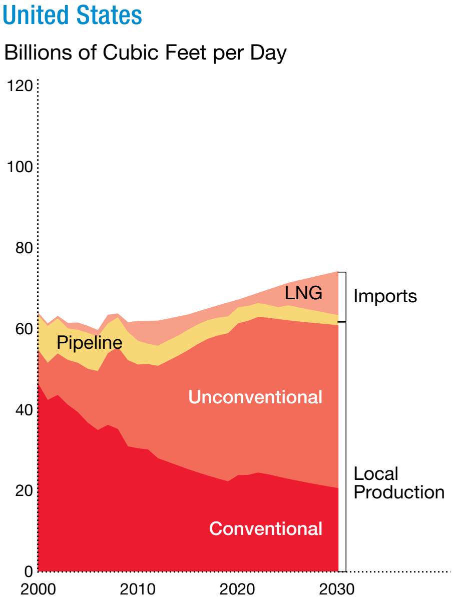
The gap between non-OPEC supplies and total liquids demand – known as the "call on OPEC crude" – remains relatively flat in the near term, but then expands to 37 MBDOE in 2030. This level is achievable, given OPEC's large resource base and continued investment.

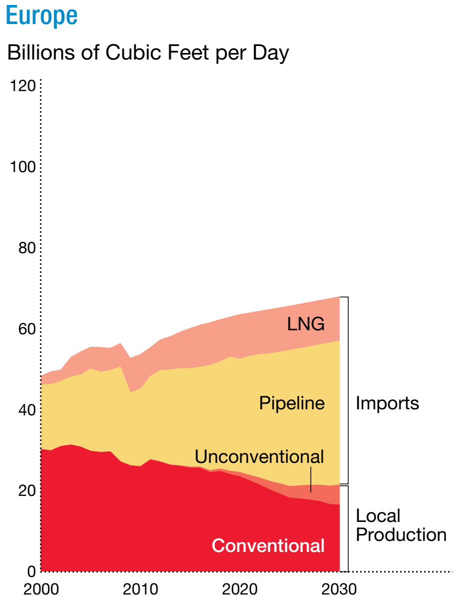
Total liquids supply needed in 2030 is about 20 MBDOE above 2005. This increase will be met by non-OPEC and OPEC liquids in nearly equal share.

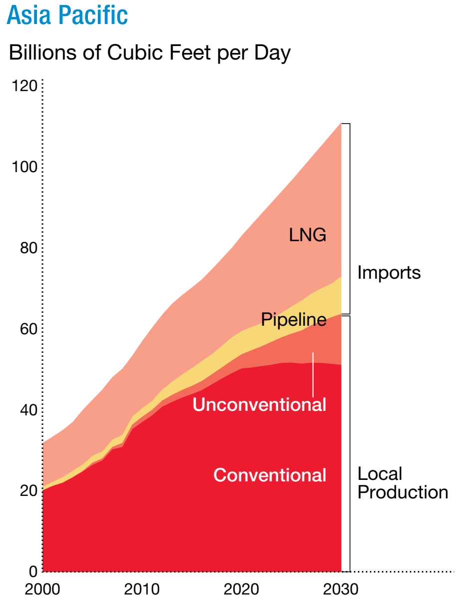
Meeting this demand in an economic and environmentally sound manner is an ongoing task of the global energy industry. It will require large investments to maximize yields from mature fields as they naturally decline, and develop new sources of supplies in existing development areas as well as promising new regions.

New technologies – such as floating offshore platforms that can reach crude oil located under thousands of feet of water – are helping meet rising global demand for oil.

Natural gas supply and demand balance







Natural gas will meet a growing share of our energy needs through 2030. Given its abundance and properties as a clean-burning fuel, expanded use of natural gas in power generation can serve economic progress and help advance environmental goals as well.

Total natural gas demand in the United States and Europe will follow a similar pattern – dipping in the near term because of the recession, and then growing modestly through 2030. Growth averages about 0.8 percent per year. Asia-Pacific demand grows much more rapidly, at almost 4 percent per year, with demand more than doubling over the outlook period.

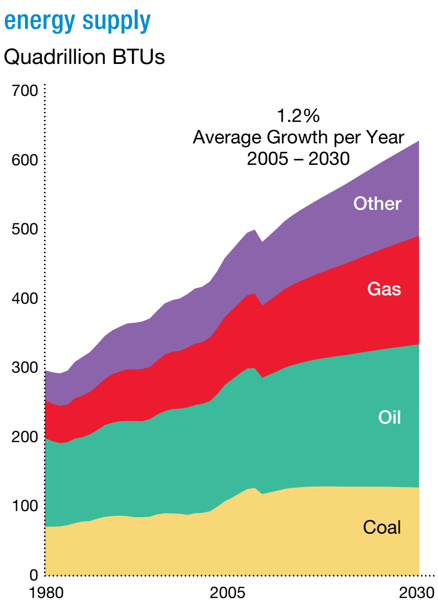
In terms of supply, an important development has been the expansion of unconventional natural gas – the result of recent improvements in technologies used to tap these hard-to-reach resources. This is particularly the case in the United States, where it is expected to satisfy more than 50 percent of demand by 2030. The growth in unconventional supplies will moderate the need for liquefied natural gas (LNG) imports in the United States in the short term.

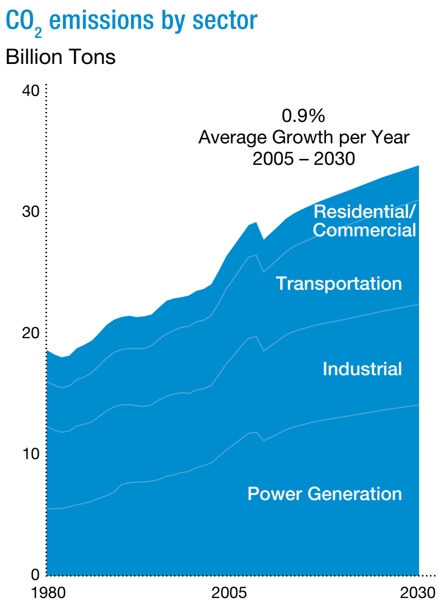
In Europe, local natural gas production continues to decline, driving imports from about 45 percent of total supply in 2005 to about 70 percent in 2030. This shift will require growth in pipeline imports from Russia and Caspian countries as well as LNG.

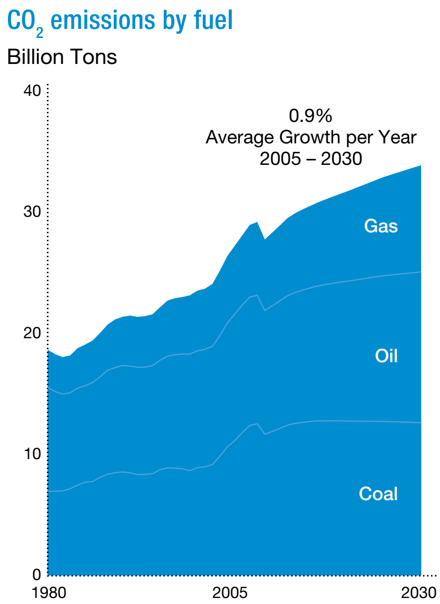
In Asia Pacific, domestic natural gas production – unconventional in particular – continues to climb, but at a slower pace than demand. As a result, Asia Pacific will need to rely more heavily on gas imports, especially LNG, which will meet more than one-third of the region's demand in 2030.

ExxonMobil and Qatar Petroleum's Q-Flex and Q-Max ships are fostering a new "global gas market" that can link the world's largest natural gas reserves with the consumers who need them.

Global energy demand and CO_2 emissions







Rising emissions of CO_2 and other greenhouse gases pose significant risks to society and ecosystems. Since most of these emissions are energy-related, any integrated approach to meeting the world's growing energy needs over the coming decades must incorporate strategies to curb emissions and address the risk of climate change. These strategies will need to be implemented by both OECD and non-OECD countries.

The outlook for energy-related CO_2 emissions is linked directly to the types and amounts of energy required around the world. **By 2030, global CO_2 emissions are likely to be about 25 percent higher than they were in 2005.**

While this is a significant increase, it is substantially lower than the projected growth in energy demand over the period. This positive development is the result of expected gains in efficiency, as well as a shift over time to a significantly less-carbon-intensive energy mix – mainly natural gas, nuclear and wind gaining share as fuels for power generation. Natural gas used for power generation can result in up to 60 percent less CO_2 emissions than coal, currently the most widely used fuel for power generation.

Broken down by end-use sector, power generation accounts for the largest share of the growth in CO_2 emissions through 2030. This is not only because it is the fastest-growing demand sector, but also because it is the one that relies most heavily on coal.

Global CO_2 emissions will rise by 0.9 percent a year through 2030, with emissions growing fastest in the power-generation sector.

Options for carbon policy

ExxonMobil believes that the broad objective of actions to address climate change should be to reduce the risk of serious impacts on society and the environment, while not harming the contribution of energy to economic development and expanded prosperity around the world.

As a company with 125 years of experience developing the technology and infrastructure that delivers the world's energy, we believe we have a unique perspective on what types of conditions are necessary to successfully tackle such a complex global energy challenge.

Above all, companies, consumers and investors will need a market environment that provides clear signals to encourage sensible and broad-based investment in the two most powerful emissions-fighting tools: improvements to energy efficiency and the expanded use of lower-carbon fuels such as natural gas. Continued progress on these fronts will require trillions of dollars in new investment, and steadfast work on the creation of new technologies.

Some governments are considering policies that would impose a "cost" on CO_2 emissions. In these cases, ExxonMobil believes that a **revenue-neutral carbon tax** has many advantages over a cap-and-trade system in terms of achieving our society's shared goal of reducing emissions over the long term:

- A carbon tax can **create a clear and uniform cost for emissions** in all economic decisions. This price stability encourages companies to invest in advanced technologies, and provides a clear incentive for all consumers to increase efficiency and reduce emissions.

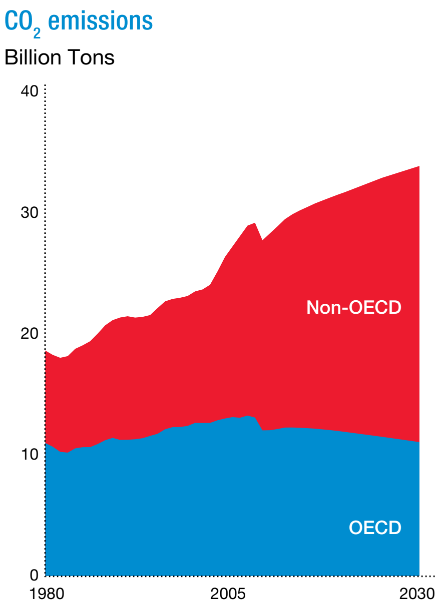
- A carbon tax **avoids the costs and complexity** of having to build a new market for emissions allowances or the need for new layers of regulators and administrators to manage this market. It also does not open up significant opportunities for market manipulation, or require complex and costly compliance and enforcement systems.

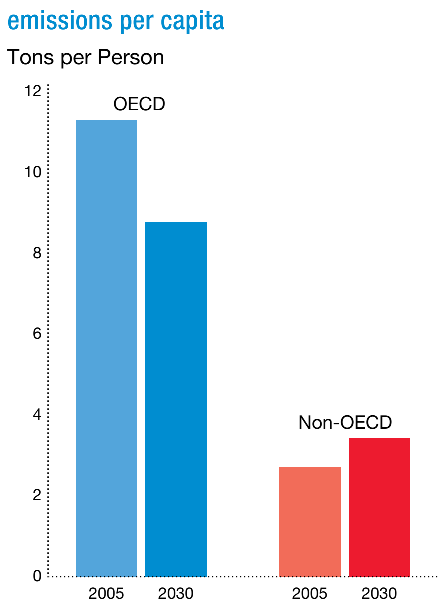
- **A carbon tax can be made revenue-neutral.** Returning the tax revenue to consumers through reductions in other taxes – payroll taxes or a simple dividend – reduces the burden on the economy, and ensures that government policy is specifically focused on reducing emissions, not on becoming a revenue stream for other purposes.

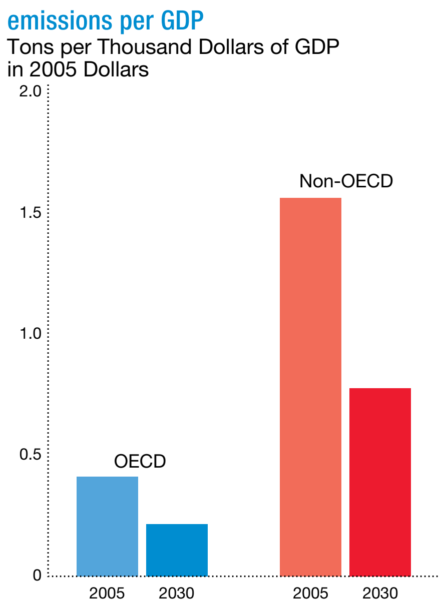
- Because global participation is so important to controlling emissions, a carbon tax may be a more viable framework for **engaging participation by other nations**.

As *The Outlook for Energy* shows, curbing greenhouse gas emissions while also meeting rising energy demand will require a tremendous global effort, sustained over decades. Compared with a cap-and-trade system, a carbon tax – by being predictable, transparent, and comparatively simple to understand and implement – is a more effective approach for creating the conditions necessary to achieve emissions-reduction goals.

CO_2 emissions







Reducing emissions is a global priority. Yet because different countries are at different stages in their economic development, CO_2 emissions patterns through 2030 vary greatly between OECD and non-OECD country groups.

Growth in CO_2 emissions through 2030 will be dominated by China, India and the other non-OECD countries. Non-OECD emissions surpassed OECD emissions in 2004; by 2030, non-OECD countries will account for two-thirds of the global total.

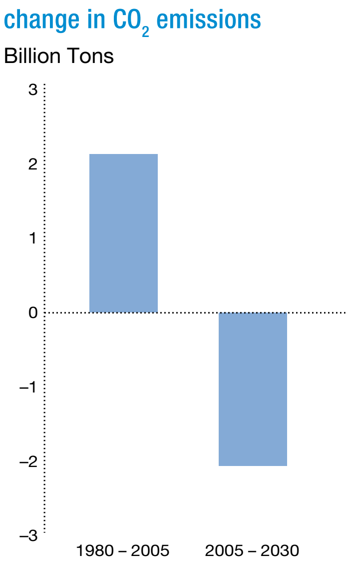
Meanwhile, OECD emissions will decline by about 15 percent, and by 2030 will be down to 1980 levels.

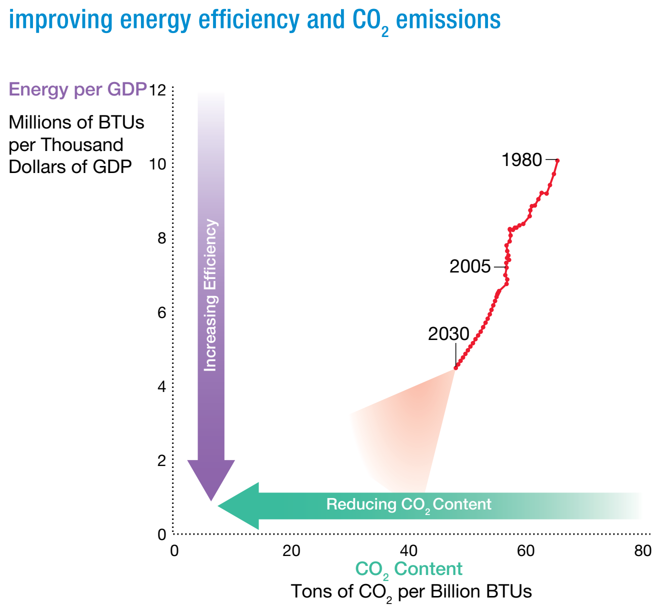
When comparing the CO_2 emissions of OECD and non-OECD countries, several measures can be used – producing very different results. On a per-capita basis, 2005 emissions in the OECD were about four times that of non-OECD countries, consistent with the higher per-capita energy use in that country group. By 2030, this gap shrinks, but remains significant – at about two and a half times higher.

When emissions are measured per unit of economic output, however, OECD nations have much lower levels. This is because developed nations have relatively productive economies and are less energy-intensive. By 2030, this gap also shrinks, although OECD nations remain far less energy-intensive than non-OECD countries.

Non-OECD countries account for all of the CO_2 emissions growth through 2030, yet their per-capita emissions remain far lower than the OECD's.

OECD transitions to lower emissions





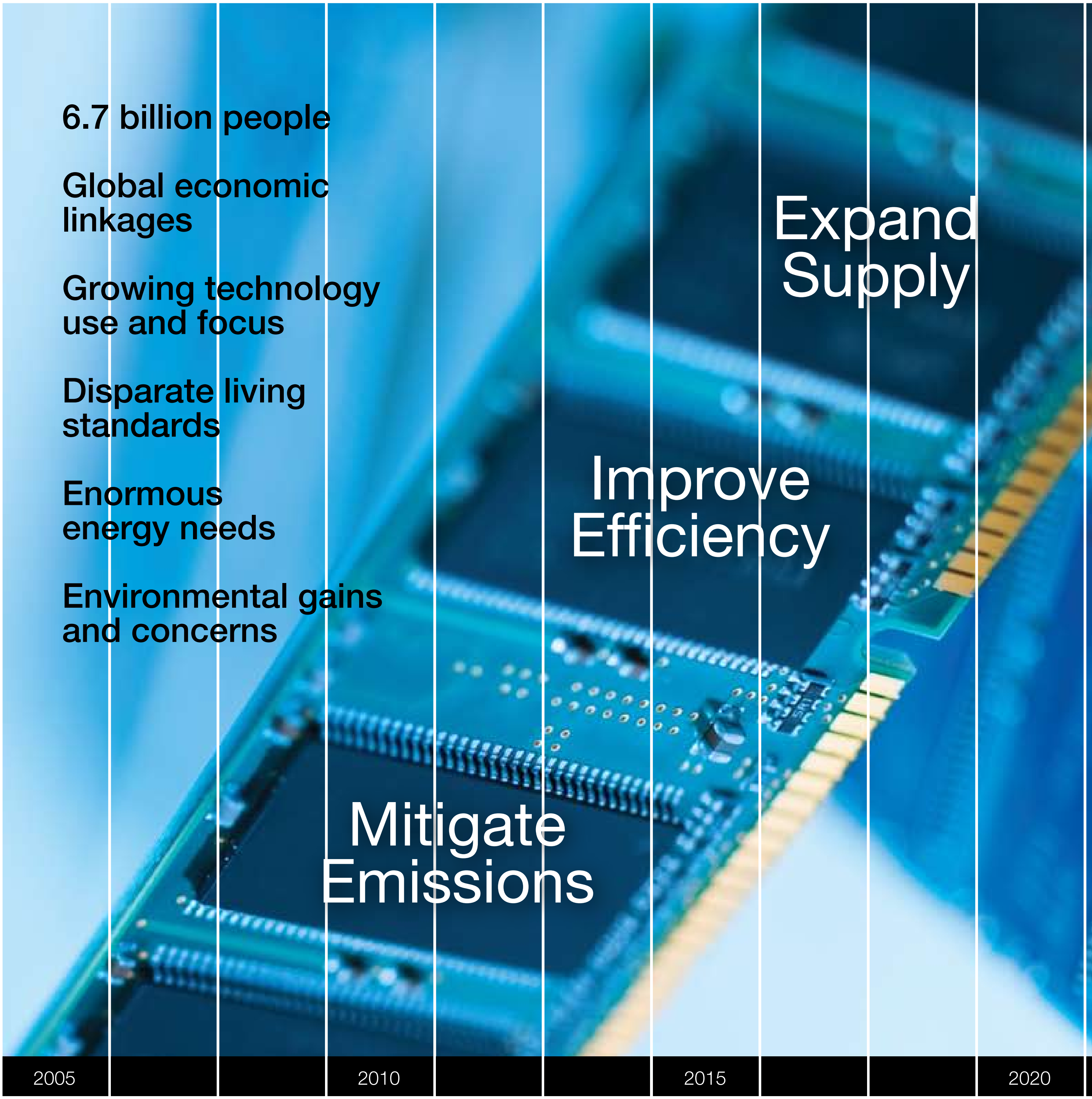
As a result of ongoing efficiency improvements and a switch to less-carbon-intensive fuels such as natural gas, CO_2 emissions in the OECD appear to have already peaked and are set to trend lower through 2030.

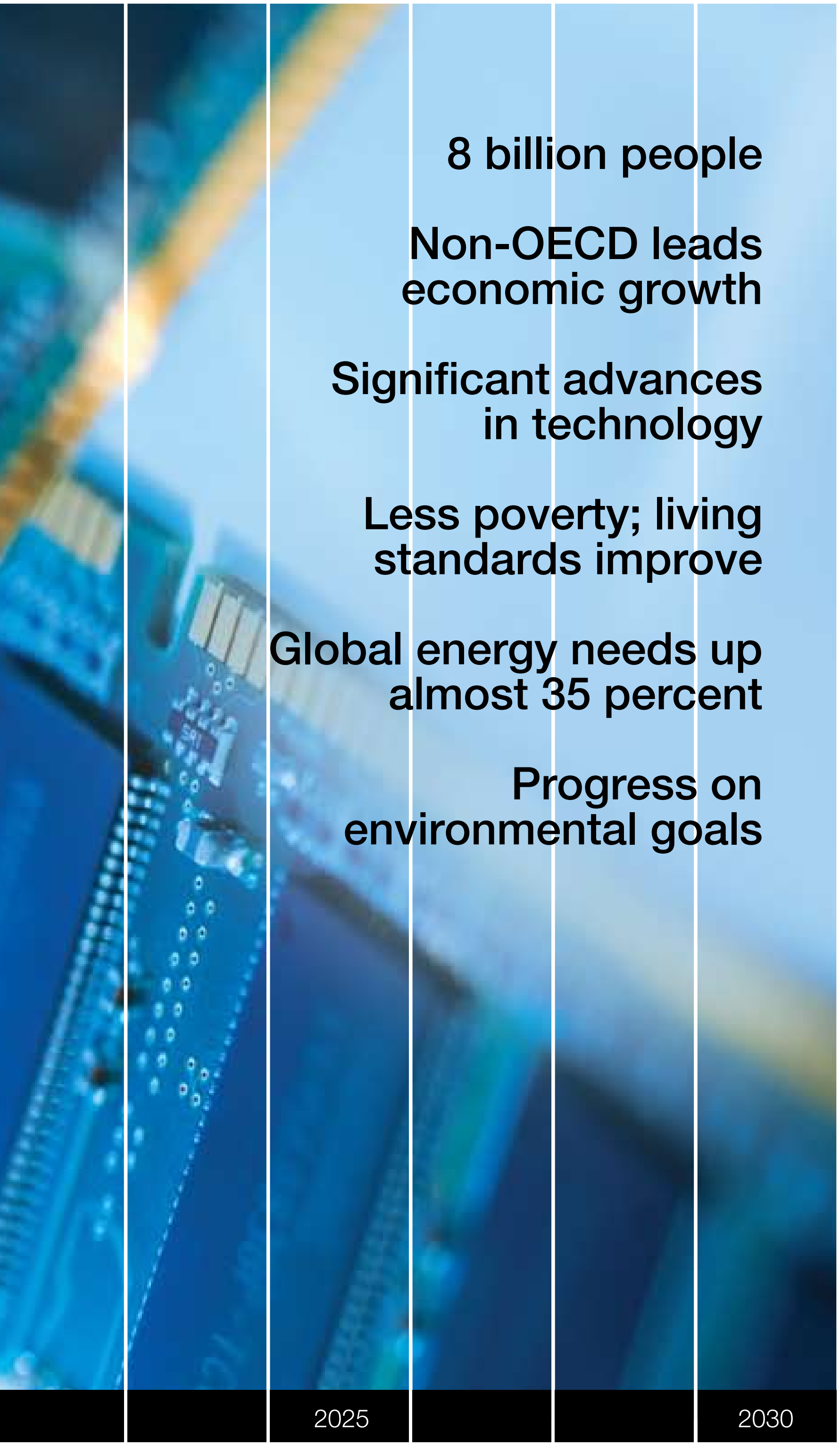
Absolute CO_2 emissions in the OECD rose by about 2 billion tons from 1980 to 2005. But from 2005 to 2030, we expect them to fall by about 2 billion tons, and by 2030 be back to about 1980 levels. This is a noteworthy achievement considering that OECD economic output will have tripled over the period and population will have grown by about 30 percent. This proves it is possible to achieve economic growth and also reduce the impact of energy use on the environment.

How has this progress been achieved? To curb CO_2 emissions and still meet rising energy demand, we have two main tools. One is improving energy efficiency – doing the same or more with less energy by employing advanced technologies and making smart choices about how we use energy to fuel vehicles, generate electricity and power homes and businesses. Another is reducing CO_2 intensity – choosing fuels that have lower CO_2 emissions.

From 1980 to 2005, OECD energy usage became both more efficient and less carbon-intensive. Through 2030, we see this positive trend continuing. **Beyond 2030, further gains are likely as OECD countries continue to pursue efficiency and shift to less-carbon-intensive fuels to help mitigate risks associated with CO_2 emissions.**

Integrated energy solutions





By 2030, there will be more than 1 billion additional people on the earth – in total, close to 8 billion people, all seeking better living standards. Economic expansion will be key to reducing poverty and improving health and prosperity, and we expect developing countries to expand their economies rapidly toward that end. This will require reliable and affordable energy, driving demand up by close to 35 percent versus 2005. At the same time, there is an ongoing need to protect the environment for future generations.

These interlocking challenges require an integrated set of solutions. No single source of energy, sector of the economy or segment of society can solve all of these challenges. In our view, there are three key elements related to energy:

- Accelerating gains in energy efficiency, which conserves supplies, minimizes energy costs and reduces the growth rate of both energy demand and emissions
- Expanding the availability of reliable and affordable energy supplies
- Developing and deploying technology to help mitigate the growth of emissions associated with energy use.

We believe it is prudent to pursue strategies that address the long-term risks associated with rising emissions, while keeping in mind the central importance of energy to the economies of the world. In this light, it is essential to consider and implement policies with the lowest overall cost to society. This requires economy-wide, predictable and transparent costs to shape business and consumer plans and investments. Global participation is also critical to reducing costs and risks.

We must pursue each of these three elements with vigor if we are to meet our global energy and environmental challenges. Technology will, as it has in previous decades, continue to play a critical role in enabling all three of these areas.

The Outlook for Energy through 2030 – key findings

Demand

Economic recovery and growth, coupled with rising populations and living standards, will push energy demand up by **1.2 percent a year** on average through 2030.

- By 2030, global energy demand will be almost **35 percent higher** than in 2005. This assumes significant gains in energy efficiency. Without efficiency improvements, demand in 2030 could be about **95 percent higher**.
- **All** the growth in demand through 2030 occurs in non-OECD countries, where economies are growing most rapidly. Non-OECD energy demand rises by more than **60 percent**; demand in OECD countries **declines slightly** even as their economies expand.
- **Power generation** is the largest and fastest-growing sector. By 2030, power generation will account for **40 percent** of all energy demand.
- Demand for **transportation** fuels continues to increase, due largely to greater use of heavy-duty vehicles (trucks and buses). Demand for light-duty vehicles (cars and SUVs) actually plateaus and **declines** toward 2030.

Supply

To meet demand through 2030, we will need to expand **all** economic energy sources. Demand will be strongest for fuels that can help **reduce CO_2 emissions**, such as natural gas.

- **Oil** remains the largest energy source through 2030, but natural gas will move into second place ahead of coal. In 2030, these three fuels will meet close to **80 percent** of global energy needs.
- **Natural gas** will be the fastest-growing major fuel. By 2030, demand for natural gas will be more than **55 percent** higher than in 2005. Technologies that have unlocked "unconventional" gas will help satisfy this demand.
- **Nuclear and renewable fuels** will see strong growth, particularly in the power-generation sector. By 2030, about **40 percent** of the world's electricity will be generated by nuclear and renewable fuels.
- One of the most important "fuels" of all is **energy efficiency**. The energy saved by improved efficiency through 2030 is larger than from any other single source, including oil.

Emissions

Global CO_2 emissions will rise by an average **0.9 percent a year** – a significant increase but substantially slower than the pace of energy-demand growth because of improved efficiency and a shift toward lower-carbon fuels.

- Non-OECD countries account for **all** of the CO_2 emissions growth through 2030, yet their per-capita emissions remain **far lower** than the OECD's.
- CO_2 emissions in the United States and other OECD countries are declining, even as their populations and economies grow; by 2030, OECD emissions will be **approaching 1980 levels**.
- Emissions grow fastest in the **power-generation sector**, in part because it is the sector that relies most heavily on coal.
- Beyond 2030, further progress on emissions will require more **aggressive gains in efficiency** and/or the use of **less-carbon-intensive fuels**. New technologies will be essential on both fronts.

Improve efficiency. Expand energy supplies. Mitigate emissions. Develop new technologies. Each of these solutions will be needed to meet our interlocking energy challenges through 2030 and beyond.

The Outlook for Energy is available on our Web site at **www.exxonmobil.com**.

Glossary

ExxonMobil's *Outlook for Energy* contains **global projections for the period 2005-2030**. In the *Outlook*, we refer to standard units for the measurement of energy:

BCFD. Billion cubic feet per day. This is used to measure volumes of natural gas. One BCFD of natural gas can heat approximately 5 million homes in the U.S. for one year. Six BCFD of natural gas is equivalent to about 1 MBDOE.

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.

Gigawatt (GW). A unit of electric power, a gigawatt is equal to 1 billion watts, or 1,000 megawatts. A 1-GW power plant can meet the electricity demand of approximately 500,000 homes in the U.S.

MBDOE. Million barrels per day of oil-equivalent. 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 MBDOE is enough energy to fuel about 3 percent of the vehicles on the world's roads today.

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