Appendix A: Detailed Scenario Description and Regional Inputs

1- Africa & ME

Issue	1-Freeway	2-Tollway
General	• World with solutions where pure market forces prevail	• Regulated world where governments and politicians decide to put common interests at forefront and intervene in markets
Players	• Private sector leads • Global companies emerging as central players • Entrepreneurs • Consumers	• Public sector leads • Local Governments acting as central planners • NGOs • Citizens
Trade	• WTO makes progress on competitive issues • Free and expanding international trade in regard to trade & barriers removals. • Globalized economy • Global competition and occasional trade disputes • High global trade imbalances • Trade activities increase with other countries especially China and India. • Trade is made mainly around minerals, metals, and agriculture. • Trade ties with OECD countries continue and strengthen.	• WTO shows increased emphasis on free flow of green goods and services • Increased international cooperation on climate change issues in the short to medium term. • Individual countries/regions preferring local content and solutions • More fragmented and /differentiated global economy • More trade restrictions due to regional concerns • Trade is focussed with small set of selected countries (countries with high technology are invited to invest in South Africa; Germany, USA, and China as examples). • Interregional trade increases between Southern African nations.
International Institutions	• Less prominent international institutions	• Stronger role for international and multilateral institutions
FDI	• Increased level of FDI	• Same or less • Increased national investments • Few selected industrial sectors are targeted for FDI.
Technologies	• Technological innovation market driven • Emerging innovation centres attracting and competing for investment capital and human resources • Original Equipment Manufacturers (OEM) develop transport solutions most wanted by consumers	• Governments picking technology winners (e.g. photovoltaic) • Higher amount of technology transfer into developing nations • Multinational technology co-operation and initiatives • More state subsidies sponsor focused research programs into new transport technologies • High degree of technology transfer into sectors that benefit the public (health, water, energy, infrastructure) • Multilateral sponsorship programs and with Millennium goals as driving factors • Benefits of tech transfer do not accrue to other sectors.
Capital & Labour	• Free flow of capital & labour • Flow of foreign capital and workers (all skill levels) from OECD and Asian countries. • Competitive labour market. • Domestic worker unemployment increases, especially in skilled sectors.	• Restricted flow of capital & labour • Investment is targeted in select sectors (mining & energy) via government intervention. • Only highly-skilled foreign workers are permitted into the labour market. • Domestic unemployment is low, but so is productivity.
Manufacturing centres	• Manufacturing established in low cost centres & close to major markets	• Manufacturing established in less optimal locations but with regional development and factors in mind
Infrastructure	• Patch work of improvements in many regions • Public infrastructure does not develop to the same level as in Tollway.	• New infrastructure projects, mainly in renewable energy and public transport, state funded • Access to energy and public transport schemes promoted by international institutions (UNIDO) • Public infrastructure improves (roads & buildings). • Massive investments in road building programs. • Investment in energy infrastructure remains an urgent need, as energy access remains a top priority.. • Multilateral sponsorship programs improving proper government regulation, increasing

		• private sector investments into public sector. • Divide between rural and urban transport options increases as a result of increased investments in urban infrastructure • Accessibility of some rural areas improves due to road construction programs • extreme congestion and pollution in the major urban centres increasing • Problems with frustrated young and poor portion of the population are alleviated due to improving unemployment numbers.
Climate change	• Commercially viable Innovative Green technologies/practices flourish	• Big focus and international efforts on climate change by governments in short, medium to long terms. • Africa & Middle East are not going to go green on own volition • Local strategies aimed at providing maximum energy at lowest cost possible • Additional funding for energy efficiency programs and climate change mitigation initiatives based on foreign funding via Copenhagen mechanisms • There is consensus that a consolidated approach promoting all forms of energy is the best way forward.
Politics & competition for resources	• Pure competition creates cost-efficient solutions • Higher In some Western Africa and MENA energy-rich countries, the demographic demands in countries like Nigeria/Libya/Iraq/Iran have an impact on that country's stability and ability to export oil. • Remain mostly unstable though 2050. • Hydrocarbon supplies from MENA remain at risk. Straits of Hormuz, Bab Al-Mandab and Suez Canal remain vulnerable. • Conflicts in Libya, Sudan, Somalia, West Africa, Iraq, Iran, Lebanon, Palestine, and Yemen are expected to last for few more decades. • demand creates global competition for resources	• Less competition over energy resources • Focuses on regional supply and energy efficiency reduce competition for resources. • Unemployment improving in areas of large infrastructure investments • African middle classes developing at a slow pace • Government health programs first increase birth rates, but then lead to stabilisation and even decrease in fertility rates due to increased awareness • Political volatility due to series of backlashes based on widespread corruption and inefficiencies linked to large investments in infrastructure programs • International pressure and monitoring mechanisms based on EU model of common currency mechanisms • Arab spring in MENA is expected to end at Libya/Yemen/Syria but reforms will take years. These conflicts are expected to adversely slow down the demand for transport in these countries.
Regulation	• Low government regulation (minimum regulated environment)	• High government regulation (fully regulated environment) • Major local energy companies continue to dominate local markets.
Competitive	• Pure market forces • Market seeks competitive cost solutions • Favourable climate for open global competition • US and Chinese companies dominate, Germany continues to be an export leader	• Same or less market influence • Market distortions through government intervention • Company reputation and ability to work with bureaucratic governments become a competitive differentiator • BRIC countries outperforming OECD
Privatization, liberalization, deregulation	• Wave of privatization, liberalization & deregulation • Lack of proper government frameworks remain a challenging concern for the market • Privatization remains challenging (South Africa could be exception?)	• Same level or less • Energy and transport sector considered strategic in most countries • Government processes slowly improving
Economic Volatility	• High economic volatility • Potential super-cycles	• More stable economic environment at lower growth levels in the short term.
Wealth	• High & increasing wealth in western world & successful new industrial (SE Asia & LAC). • Africa still marginalized. • Rise of the super-rich (expats and politicians). • Wealth accrues to very select minority • Increasing number of urban poor.	• Wealth disparity is less obvious in industrial countries • Africa improving due to technology transfer (e.g. Copenhagen accord) and multi-lateral programs (e.g. UNIDO access to energy program).

	• Outpouring of civil unrest due to income disparity and increasing crime waves	• Sub-Saharan Africa has still the lowest GDP per capita ($1,138 versus a world average of $8,599) but is slowly improving at the backend of scenario period. North Africa has a relatively higher per capita GDP of close to $3,000, which is still far below the world's average. The ME is higher than Africa and stands at an average of $5,763.
R&D	• Diverse R&D efforts • Driven by both private and public sectors	• More focused R&D programmes driven mainly by public sector • International research programs and technology "clearing houses" to facilitate technology transfer. • Remains dependent on technology transfer
Carbon pricing	• Efficient carbon price mechanisms • Entry into market only after significant gains (OECD levels) in per capita income across all sections of society. • Entry post-2020 (??). • CSS will not be adopted unless mandated, price increases will be absorbed.	• Existing Clean Development Mechanisms (CDMs) may fail in EU-US and not take off in other markets • Regional limits and penalties imposed by local governments. • Set of regional agreements on climate change and introduction of carbon price mechanisms. • International incentives for countries to join, through investment funding and technology transfer system. • Entry may happen sooner, but only due to government intervention and international political pressure. • Carbon trade remains very small. • Conflict with major local energy producers may be a hurdle
Sustainability	• Cheaper but less wide-spread solutions	• More expensive sustainability (as efficient prices are not driving players actions) but faster implementation
Consumer behaviour & lifestyle	• Consumer spending increases, savings drop • Individual interests dominate • Cheapest price and highest comfort dominate and differentiate products • Increasing levels of consumption (demand for fast moving consumer goods increases). • Entry of foreign retail firms into the market. • Increasing high-street banking services & lending • Domestic savings level drops. • Demand for more sophisticated goods – high-end electronics, cars, etc.	• Consumer spending decreases, saving increases • Common interests at forefront • Consumer power used to stimulate development of greener goods and services • Social activism increases and forces producers and governments to put common interests at forefront • Best public image and corporate responsibility differentiate in addition to price • Consumption levels are lower • Very few market players (mostly local firms). • High level of domestic savings. • Tourism industry remains dominant factor in foreign spending. • Banking services growth remains limited to non-retail banking. • African individual interest remains at front. • Consumers in sub-Saharan Africa looking for any affordable transport mean. • In the higher income and more urbanized MENA, population are frustrated with the congestions and pollution problems (major cities).
Good Economic Situation-Top of Business cycle	• High but uneven distributed economic growth. • Sufficient fund for new private investments.	• Sufficient economic performance to fund government initiatives in energy. • Overall economic growth is more moderate. Still distributed unevenly across regions. • Between 1990 and 2008, Africa's GDP grew at about 3.8% per year while the ME at 3.9% per year (both higher the global average of 3.3%) • Thru 2035, Africa's GDP is expected to grow at about 3.5% per year while the ME is expected to grow at 3.9% per year (both higher the global average of 3.2%).
Bad Economic Situation-Bottom of Business cycle	• Low & uneven distributed economic growth. • Wide spread austerity packages reducing new investments and energy demand.	• Still sufficient economic performance in developing countries (shielded such as China & Brazil). Much weaker in developed. Still distributed unevenly. • Large public sector debt developing.

		• Effect of down-cycle partially mitigated by lower energy demand and import bills due to energy efficiency gains.
Population		• Sub-Saharan Africa has the world's highest population growth rate of 2.5%, relative to the global growth rate of 1.2 % and 1.9% in MENA. • Thru 2035, Africa's population is expected to grow at about 1.9% while the ME is expected to grow at 1.5% (both higher the global average compared to global average of 0.9%). Africa is expected to double by 2050. • In Sub-Saharan Africa almost 43% of the population is 14 years of age or under while in MENA it is about 31% (compared to the world average of 27.2%).
Finance	• Private Financing capital available, abundant and easy to flow	• More Limited private financing capital mostly by local institutions • Large public sector funding for infrastructure and "green" projects • There is no lack of credit and willing investors for energy infrastructure investment.
Corruption	• Could lessens in many regions	• Tops list in South Asia, Sub-Saharan Africa, transition economies. • Corruption is still a concern in most countries (with the exception of high income ME countries).
Bureaucracy	• Lessens in many regions	• Remains an issue everywhere. • Sub-Saharan Africa is the least bureaucratic in the world (world economic forum results). • Bureaucracy in MENA remains high.
Tax regulation	• Taxes (as a market distortion) drops in many regions	• Constitutes a severe constraint on OECD and post socialist transition economies. • New taxes needed to finance large public sector debt in Western economies • About average (world economic forum results).
Subsidies	• Subsidies (as another market distortion) removed in many regions. Remaining subsidies mainly in renewables.	• Subsidies remain and increase for green goods and services. • West Africa and MENA countries remain heavily dependent on subsidies especially subsidies related to energy resources.
Energy E&P	• Many countries open their upstream sectors resulting in a surge of supply. • Moderate oil prices in the short term. • More security of supply and demand • Fossil fuel dominance reducing only gradually • High growth of energy demand, leading to higher prices at the end of scenario period. • Industrial demand for energy reaches all time peak • Electricity prices increasing sharply, leading to energy poverty • Boost to coal and mining industries. • Sasol makes big gains. • Eskom has to put up with increasing competition from private power sector. • Regional power sharing agreements to balance countries' transmission systems. • Oil pipeline infrastructure is developed in the latter half of the next decade.	• Lack of opening new areas for E&P leading to tight supplies • High infrastructure costs for early integration of renewable energy sources • higher oil and energy prices at the beginning of scenario period, but lower, more stable prices after quicker transition to renewable energy sources • Oil price is tightly regulated • Security of supply and climate change concerns push drive to reduce dependence from fossil fuels • Clean coal and CCS socially unacceptable in EU and US but becomes a must for developing world • Electricity prices increasing sharply, leading to energy poverty and government subsidies for lower incomes • Export oriented growth model. • Role of Eskom is predominant. • Interregional power sharing agreements to meet demand • West Africa and MENA's transport situations benefit from the fact that most of these countries have energy reserves, or access to them, that help to fuel a higher level of motorization than that found in the rest of Africa.
Liberalization, policy agreements	• Liberalized energy markets and high competition for resources on a global basis • Easy to reach international agreements on removing trade barriers	• Limited competition and participation • Policy agreements of "coalitions of the willing" to reduce greenhouse gas emissions and setting of (increasingly) international standards for

	• No agreements on international energy policy due to competing interests. • Energy market lacks of ability to reach international agreements and common set of basic rules	carbon pricing • Stronger role for international institutions to set policies
Policy initiatives	• Policy initiatives aimed at setting framework conditions for market solutions to emerge • Policy is influenced by free market thinking. • Generation and transmission is unbundled. • Foreign investment in energy sector will be in the form of partnerships with domestic firms to allow technology and knowhow transfers. • Policy will focus on diversifying fuel mix • Proactive policies.	• Energy policy initiatives set by centralized government where regulations of energy sector reverts to national states • High focus on maintaining government subsidies (impacts future investment on generation capacity). • Reactive policies.
International cooperation	• Successful international coordination on free market mechanisms	• International coordination of energy taxes progressing
Energy Saving	• Significant saving (higher prices/efficient markets) •	• Large government focus on energy efficiency and energy saving programs • Efficiency brands (Like Energy Star) become dominant in consumer minds • Dependant on government mandates. • Eskom will implement efficiency measures in case of generation shortfall.
Energy Consumption	• High economic growth yields high energy consumption	• High impact from energy efficiency and energy saving programs • Global demand for energy is also lower because of lower growth and changes in lifestyle. . • Transport in Africa mostly uses conventional gasoline and diesel • In 2008, Africa consumed 28 mtoe (about 0.564 million barrels per day) of gasoline and about 38 mtoe (about 0.765 million barrels per day) of diesel. • Similarly, the ME consumed 46 mtoe (about 0.939 million barrels per day) of gasoline and about 54 mtoe (about 1,082 million barrels per day) of diesel. • Consumption is expected to double for Africa (from~ 100 mtoe to ~200 mote) and triple for ME (from ~100 to ~300 mote) by 2050, again mostly gasoline and diesel (IEA baseline). • Road transport increasing (more than in Freeway) due to road construction programs
Transport Intermodal	• Individual transport solutions • Solutions are more short term and lack wide perspectives • Rail and bus companies are privatized. Operation of public transport is privatized. • High fuel efficiency measures implemented by operators. • Electrification of urban public transport remains dependant on government policy support. • Transport options from industrial hinterland to urban centres widen.	• Stronger emphasis on public transport • Solutions are long term with a wide perspectives • Public transport monopolies. • Electrification mandated by government policy. • Transport links between hinterland and urban centres continue to be underdeveloped. • Individual transport solutions dominating.
Air Traffic/Freight	• High growth of air traffic and freight sector • Dependent on petroleum • Increasing fuel economy	• Less growth due to lower economic growth • Dependent on petroleum • Lesser fuel economy measures • For Africa, Boeing expects a growth rate of 5.5% for passenger and 6% for cargo per year thru 2029. • For ME, Boeing expects a growth rate of 7.1% for passenger and 6.8% for cargo per year thru 2029.
ICEs	• High efficiency ICEs	• High efficiency ICEs • In 2005, the passenger LDV stock is about 15 million vehicles in Africa and about 15 million in ME. • New car sales in Africa are about 1.6 million /yr and the same in ME. • Used cars inflow to Africa is about 243,000 cars in 2005 (mostly from EU) and about 391,000 in ME (mostly from US followed by Japan).

		• Conventional ICEs dominates existing stock/new sales /used sales. • ICE is expected to dominate thru 2050.
Hybrids	• More hybrids	• moderate hybrids share growth • Now, minimum level and potential
EVs	• Batteries still expensive. • With time, R&D will drive battery prices down • competitive market facilitate new business models for battery replacement • Oil still a necessity for most transport demand, even in 2050. • Innovation centres in the Eastern markets and mega-cities drive the introduction of large numbers of EVs due to air quality concerns in mega cities. In the longer term, low cost EVs penetrate western markets. • Intra-city personal transport solutions viable only post-2020 (??). • Crucial factor will be battery capacity and charging infrastructure.	• Earlier penetration of EVs and more use of electricity in public transport fleets (government directed). • Efficiency of electric vehicles transforms energy demand and landscape. However, impact really visible after 2025. By 2050, EV expected to be 40% of the LDVs demand share (extreme case as in IEA's 450 level). This is subject to significant improvement to the grid systems. • Fossil fuels reduced to cover 30% of LDVs transport energy demand in 2050. Remaining 30% is provided by Biofuels and FCs. • Lower OECD transport emission (assuming CCS for power generation) in the long run. • Main emerging economies avoid mistakes of developed world, leapfrogging technologies. • Limited to public transport fleets. • Subject to capacity availability of Eskom in South Africa • Heavily subsidised. • Company fleets (??) • Now, minimum level and potential
CNGs	• More CNGs if gas reserves available as E&P accessible by IOCs	• CNGs significantly in transport early on by local governments with access to domestic gas reserves. • Minimum level and potential
FCs	• FCs small breakthrough as they are still expensive	• Fuel cells adopted to reduce dependency on foreign oil • Minimum level and potential
Biofuels	• Food crisis depresses global biofuels growth • Strong regional hubs in both North and South America • Gene technology used to grow energy crops (except EU). • 2nd & 3rd generations are still expensive	• Increasing contribution of 1st gen. biofuels to fuel mix • Larger impact on food prices • Gene modifications of crops still not accepted in EU. • Large contribution of second (and 3rd ?) generation biofuels in the long term • First generation biofuels have a potential in areas where they do not threaten food security (e.g. ethanol production in Swaziland).
Urban Planning	• Good economies will invite better planning and problem solving. • Increasing move from rural to urban areas. • Cities grow at a high rate – increasing congestion on roads and land space. • Rural areas become the target for large-scale, plantation-type farming enterprises.	• Governments alone can poorly direct/coordinate urbanisation • Problems worsen with tight government budgets and bad economies. • Move from rural to urban areas continues, albeit at a lower rate. • Cities continue to grow and areas of the cities turn into ghettos/slums – resulting polarization of society. • Rural areas continue to engage in subsistence farming. • Only about 36% of the sub-Saharan Africans live in cities compared to around 60% in MENA. The world average is about 50%. • Good economies will invite better planning and problem solving. • Increasingly, young MENA are migrating to the major cities looking for employment, adding more stress on the urban infrastructure (housing, infrastructure, and transportation). This is faced by very little public planning. • Urbanisation is growing faster than government response.
High Speed rails	• There could be problems with corridors and private sector funding.	• Penetration of high speed rail networks at a larger scale, especially in second half of scenario period • Minimum level and potential
Vehicles Ownerships	• More vehicles ownerships	• Less car ownerships & more reliance on public

		transport systems, car sharing and rentals. • In 2005, Africa had the lowest private car ownership in the world with only 20 privately-owned cars per 1,000 people. In ME, the level is relatively higher (80 cars per 1,000 people). • Private car ownership is something that many young Africans & ME would like to have , particularly in the absence of reliable, affordable, and convenient mass transit and public transportation options
Aviation, Shipping, Rails & Trucks	• High growth for both passenger travels and freight especially in eastern markets.	• More moderate growth levels. • High growth for both passenger travels and freight 5-6% per year. • Over the next 20 years, Boeing expects the Africa passenger fleet to double from 660 planes to 1130 planes and the ME to more than double from 950 to 2440 planes.

2- Asia

Issue	1-Freeway	2-Tollway
General	• World with solutions where pure market forces prevail	• Regulated world where governments and politicians decide to put common interests at forefront and intervene in markets
Trade	• WTO makes progress competitive issues??? • Free and expanding international trade in regard to trade & barriers removals. • Globalized economy • Global competition and occasional trade disputes • High global trade imbalances • Trade between OECD countries, China and India grows substantially. • ASEAN trading bloc becomes a major player in world trade. • Focus of China on Africa as a food source grows.	• WTO shows increased emphasis on free flow of green goods and services • Increased international cooperation on climate change issues in the short to medium term. • Individual countries/regions preferring local content and solutions • More fragmented and /differentiated global economy • More trade restrictions due to regional concerns • Chinese growth begins to be domestically driven. • China remains the predominant trading nation in Asia. • India continues to remain a business process outsourcing (BPO) hub, but its share begins to erode as Eastern Europe starts IT development. • Trade polarizes into Western and Eastern blocs
International Institutions	• Less prominent international institutions	• Stronger role for international and multilateral institutions
FDI	• Increased level of FDI	• Same or less • Increased national investments • FDI remains constrained • FDI levels are up 43% since last year, with the 21% of foreign equity being attracted by the services sector. • India continues to lag. Total FDI inflow from 2000-2011 was $ 19billion. • Services attracted 21% of FDI in April 2011 (almost three times the next highest). Housing – 7%, Construction – 7%, Automobiles – 5%, Power – 5%, Metallurgical – 3%, Petroleum & Natural Gas – 2%. • Over the same period, FDI in China for 2010 was $ 105.7 billion. Main focus manufacturing. Road network in China increased 7-fold from 2000-2005 to 1,930,500 kms. By end of 2005, length of running railways in China was 75,000 kms, up 10% since 2000.
Technologies	• Technological innovation market driven • Emerging innovation centres attracting and competing for investment capital and human resources • Original Equipment Manufacturers (OEM) develop transport solutions most wanted by consumers • India becomes an R&D hub in South Asia, and its infrastructure improvements enable it to achieve double digit growth year on year.	• Governments picking technology winners (e.g. photovoltaic) • Higher amount of technology transfer into developing nations • Multinational technology co-operation and initiatives • More state subsidies sponsor focused research programs into new transport technologies • High-end tech research remains in OECD countries due to lack of Asian investment in domestic R&D.

	• Japanese technology transfer to Asian manufacturing countries.	• Intellectual property violations become a major bone of contention between China and other countries, slowing technology transfer.
Capital & Labour	• Free flow of capital & labour • India becomes host to increasingly large amounts of capital repatriated by US and UK non-resident Indians. • Labour market booms due to infrastructure investments. • Asian job market becomes a target for highly experienced western professionals seeking growth opportunities. • Asian labour market becomes more mobile.	• Restricted flow of capital & labour • Capital inflows from western economies depend on currency conditions of Eurozone and US debt levels. • Middle Eastern countries (i.e. Saudi Arabia and Qatar) seek to make investments in developing Asian countries. • Domestic equity markets contribution is low. • Major energy investments made by governments to meet domestic energy demand. • Labour market remains in current status. Declining employment in rural areas increases labour push to urban centres.
Manufacturing centres	• Manufacturing established in low cost centres & close to major markets	• Manufacturing established in less optimal locations but with regional development and factors in mind
Infrastructure	• Patch work of improvements in many regions •	• New infrastructure projects, mainly in renewable energy and public transport, state funded • Access to energy and public transport schemes in Africa and developing Asia are being promoted by international institutions (UNIDO) • Infrastructure investments are made by central governments (growth is slow) scale is limited due to size of government holdings. • Chinese investment in infrastructure continues to develop strongly, levelling off by 2035/2040.
Climate change	• Commercially viable Innovative Green technologies/practices flourish • Clean energy technologies will only be implemented if international funding is obtained.	• Big focus and international efforts on climate change by governments in short, medium to long terms. • Chinese investment in renewables in 2009 was US$ 34.6 billion, which was higher than the US. Set to increase even further • It is also the world's leading consumer of coal and coal-fired electricity. • CCS technology is expected to play a significant role in the future with dozens of full scale pilot plants operating at the end of the scenario period. • The priority for energy access and reliable electricity supply supersedes the need to address climate change concerns in most developing countries in Asia.
Politics & competition for resources	• Pure competition creates cost-efficient solutions • Higher demand creates global competition for resources • Pressure on North Korea to democratize. • Chinese economic growth and infrastructure development limited by resource constraints • Political unrest increasing due to poverty divide	• Less competition over energy resources • Focus on regional supply and energy efficiency reduce competition for resources • The Chinese political system is scheduled to go through a power transfer in 2012. The old ruling elite will step down and give way to a newer generation. The focus will be on maintaining a steady level of economic growth along with social stability. Indicators of social unrest will be watched very closely by the government. Militarily, China will be seeking to exert its influence in the Asian region more strongly. Stability will hinge on a minimum economic growth of about 9%. • The Korean peninsula instability seems to last for few more decades. • India-Pakistan nuclear war threat will hang over for many years until Kashmir problem is solved. • US influence waning, Asia looks increasingly to itself •
Regulation	• Low government regulation (minimum regulated environment), especially with China reducing government interference/involvement. • Non-performing public assets are privatised. • Higher degree of Chinese dissident opinions forming out of market driven economic	• High government regulation (fully regulated environment) • Domestic private conglomerates and industrialists begin to meet demand for services creating more market distortions (rise of monopolies) • Government regulation remains high in China. Large infrastructure programs keep large sectors

	developments • New Chinese political power blocks forming from within the communist party	of the population employed and political reforms stay on the back burner • India is has a more liberal regulation policy, but the size of its bureaucracy limits its growth potential.
Competitive	• Pure market forces • Market seeks competitive cost solutions • Favourable climate for open global competition	• Same or less market influence • Market distortions through government intervention
Privatization, liberalization, deregulation	• Wave of privatization, liberalization & deregulation	• Same level or less • Energy and transport sector considered strategic in most countries • India liberalised in 1991 and has experienced an average annual GDP growth rate of 4.8% (1990-2009) (World Bank). Chinese growth rate over the same period has been 9%. • The biggest sector for FDI in India is Services, while in China, Thailand, and Taiwan it is manufacturing. • India infrastructure investments increasing at a rapid pace, albeit regionally very different • Some Indian state and city governments are starting to address the urbanisation and energy poverty challenges
Economic Volatility	• High economic volatility • Potential super-cycles	• More stable economic environment at lower growth levels in the short term.
Wealth	• High & increasing wealth in western world & successful new industrial (SE Asia & LAC). • Africa still marginalized. • Overall ASEAN per capita incomes rise. • Flow of capital from traditional high-income Asian nations like Japan, Hong Kong, Singapore to China, India, Vietnam, & Thailand. • Standard of living increases across smaller ASEAN countries. • India continues to lag due to large rural population.	• Wealth disparity is less obvious in industrial countries • Africa improving due to technology transfer (e.g. Copenhagen accord) and multi-lateral programs (e.g. UNIDO access to energy program). • Governments continue to subsidize rural populations. High possibility of balance of payments crises. • Urban middle class continues to grow due to rural influx • Wide variation in GDP per capita figures across Asia (2009, current US$, World Bank). • Can categorize them according to certain economic development stages. GDP per capita are high for OECD members (Korea = $ 17,078 and Japan = $ 39,7380 and low for others (China = $ 3,744 and India = $ 1,192)
R&D	• Diverse R&D efforts • Driven by both private and public sectors	• More focused R&D programmes driven mainly by public sector • International research programs and technology "clearing houses" to facilitate technology transfer. • While most of the manufacturing is done in China/Korea/Japan, the R&D for high-end electronics is carried out in countries like Germany, Japan, USA, etc. • India has a number of R&D centres on software, pharmaceuticals, and other industries and starts to outpace China in terms of technology development • Regional competition increasing • Asia as a whole (with the exception of Japan and Korea) remains dependent on technology transfer.
Carbon pricing	• Efficient carbon price mechanisms • Carbon markets begin to gain a foothold in high-income Asian countries – Singapore, HK, Japan. • Indian and Chinese governments adopt carbon credit system with international funding.	• Existing Clean Development Mechanisms (CDMs) may fail in EU-US and not take off in other markets • Regional limits and penalties imposed by local governments. • Set of regional agreements on climate change and introduction of carbon price mechanisms. • International incentives for countries to join, through investment funding and technology transfer system. • Not a priority, unless international pressure is placed on governments of China and India. • Will only take place in a very small scale, along

		• with promised international funding. • Abuse of carbon trading mechanism likely.
Sustainability	• Cheaper but less wide-spread solutions	• More expensive sustainability (as efficient prices are not driving players actions) but faster implementation
Consumer behaviour & lifestyle	• Consumer spending increases, savings drop • Individual interests dominate • Cheapest price and highest comfort dominate and differentiate products • Asia opens its doors to foreign/multinational brands. • A truly global market is created for high-end consumer goods. • Increasing focus on providing consumer experiences/services instead of goods. • Credit levels rise – domestic household savings levels drop • Growth of smaller firms where innovation thrives. •	• Consumer spending decreases, saving increases • Number of middle class consumers increasing, however, during second half of scenario period • Common interests at forefront • Consumer power used to stimulate development of greener goods and services • Social activism increases and forces producers and governments to put common interests at forefront • Best public image and corporate responsibility differentiate in addition to price • Characterised by constrained demand due to limited infrastructure. • Increasing stress placed on electricity, water, and sewage systems in Asian megacities. • Rising food and fuel inflation. • Consumption levels will increase across most of the developing Asian economies. As incomes rise, there will be a shift towards demand for transport & high end products. • Large demand for cars in China, with manufacturers like BMW and Mercedes struggling to meet demand. • Entry into the markets by Retail multinational companies faces some opposition from local traders, but the move towards globalization continues. (E.g. Walmart in India) • There is huge potential for consumption of services at the domestic household and individual level. • Demand for electricity will continue to rise.
Good Economic Situation-Top of Business cycle	• High but uneven distributed economic growth. • Sufficient fund for new private investments.	• Sufficient economic performance to fund government initiatives in energy. • Overall economic growth is more moderate. Still distributed unevenly across regions. • ADB expects growth in Asia to be driven by the economies of China, India, Indonesia, Japan, Republic of Korea, Thailand and Malaysia. • Chinese economic growth is expected to be around 9.5% this year (IMF). However, there are concerns that the Chinese economy may be overheating, with a property bubble in the making. Food inflation is also rising. • GDP growth rate in India is expected to be 8.25% in 2011, dropping to 7.75% in 2012. Core inflation is rising in India. • Japanese economic output has suffered after Fukushima, affecting electronics supply chains worldwide. Growth is expected to be 2% in 2012. Japan Growth will be crippled by the national debt problems. Currently Japan's net debt stands at 128% of their GDP (higher than Greece which is at 124% of its GDP). • Thru 2035, China DGP is expected to grow by 5.7% a year compares to Asia of 5.45% and global of 3.2%. Also, India is expected to grow by 6.4% a year, over the same period.
Bad Economic Situation-Bottom of Business cycle	• Low & uneven distributed economic growth. • Wide spread austerity packages reducing new investments and energy demand.	• Still sufficient economic performance in developing countries (shielded such as China & Brazil). Much weaker in developed. Still distributed unevenly. • Large public sector debt developing. • Currencies under pressure from finance market speculations • Devaluations and trade barriers emerging • Effect of down-cycle partially mitigated by lower energy demand and import bills due to energy efficiency gains.

Population		• Currently, Asia has 60% of the world's population (4.1 billion out of 6.8 billion) • China is the most populous country today with 1.3 Billion people. India follows with 1.189 billion. • Currently, Asia's population growth is about 0.7% a year (China is 0.5% and India is about 1.3%) which is lower than the global rate of 1.2%. • Thru 2035, Asia's population is expected to grow almost at the global average (0.8% compared to global average of 0.9%). China will grow at 0.3% while India will grow at 1%. In fact, most of the growth from south Asia. By 2030, India will take over and will be the largest by 2050. • Now, almost 22% of Asia's population is 14 years of age or under (compared to the world average of 27%). South Asia is the youngest. In China 20% of the population is below 14 years while the level foe India is 31%. • Looking at future trends, Japan and China population are aging and experiencing decline while population of India, Pakistan, Bangladesh and Indonesia are growing and having younger population. • Chinese demographic change due to one-child policy will kick-in during this decade. The share of Chinese under age 15 dropped 6.3%, while that of those over 60 rose by 2.93%. This represents a shrinking labour market. • Demographic decline will become a serious concern in Japan. UN numbers estimate that 36.5% of its population will be aged 65 or more by 2050.
Finance	• Private Financing capital available, abundant and easy to flow	• More Limited private financing capital mostly by local institutions • Large public sector funding for infrastructure and "green" projects • Foreign inflows continue strongly into Asian economies.
Corruption	• Could lessens in many regions	• Tops list in South Asia, Sub-Saharan Africa, transition economies. • Corruption in Asia remains a challenge (south Asia is the most corrupted worldwide, WB). • Corruption continues to plague Indian government at the national and state levels. It is ranked 87 in the latest Transparency International Corruption Rankings with a score of 3.3 (highly corrupt).China has a policy of harshly punishing its offenders. However allegations of corruption against state officials continue to be mounted. The Chinese government so far has not tolerated any strong widespread challenge and has regularly imprisoned its harshest critics.
Bureaucracy	• Lessens in many regions	• Remains an issue everywhere. • Remains very strong in Asia, especially in India and China. All major external investors have to deal with a major bureaucratic element. This causes delays and higher project costs, especially in India. • Corruption increase due to public sector programs, however, multilateral assistance to help cope with monitoring of disposal of public funds
Tax regulation	• Taxes (as a market distortion) drops in many regions	• Constitutes a severe constraint on OECD and post socialist transition economies. • New taxes needed to finance large public sector debt in Western economies • India has an effective statutory corporate tax rate of 30 to 40%. • China has an effective statutory corporate tax rate of 25%, down from 30% in 2007. (Source: Deloitte) • Overall, tax regulations in Asia are considered low compared to OECDs.
Subsidies	• Subsidies (as another market distortion) removed in many regions. Remaining subsidies mainly in renewables.	• Subsidies remain and increase for green goods and services. • Fuel and electricity remain heavily subsidised

		• most Asian countries. Any increase at the pumps will have an immediate adverse impact on economic growth. • The Chinese government still subsidises electricity and regularly subsidies State Owned Enterprises.
Energy E&P	• Many countries open their upstream sectors resulting in a surge of supply. • Moderate oil prices in the short term. • More security of supply and demand • Fossil fuel dominance reducing only gradually • High growth of energy demand, leading to higher prices at the end of scenario period. • Industrial demand for energy reaches all time peak • Electricity prices increasing sharply, leading to energy poverty • Coal becomes a main driver for growth (widespread implementation of CCS technologies). • Gads from former USSR becomes important for China and India. • Mongolia experiences a commodities boom (rare earths/minerals). • Riparian conflicts and natural resource disputes increase.	• Lack of opening new areas for E&P leading to tight supplies • High infrastructure costs for early integration of renewable energy sources • higher oil and energy prices at the beginning of scenario period, but lower, more stable prices after quicker transition to renewable energy sources • Oil price is tightly regulated • Security of supply and climate change concerns push drive to reduce dependence from fossil fuels • Clean coal and CCS socially unacceptable in EU and US but becomes a must for developing world • Electricity prices increasing sharply, leading to energy poverty and government subsidies for lower incomes • Energy investments are funnelled into specific areas by governments (power generation infrastructure to meet urban and industrial demand for the short to medium term only). • Continued dependence on oil imports from Middle East and development of gas links with CIS, Qatar and Iran. • Formation of regional energy trading blocs. • Increasing competition for ME oil as western countries seek to maintain security of supply and Asian countries struggle to meet demand. • India and China both continue to invest in the development of their coalfields. • Gas exploration continues off the eastern coast of India. India and Iran have an oil supply agreement which has recently run into payment disputes. • The region remains heavily dependent on oil imports. • Major Asian consuming nations (China, India, and Japan) are trying to secure a foot hold in major natural resource exporting regions (Africa/Middle east) • A move has begun to exploit the resources of the Central Asian Region.
Liberalization, policy agreements	• Liberalized energy markets and high competition for resources on a global basis • Easy to reach international agreements on removing trade barriers • No agreements on international energy policy due to competing interests. • Energy market lacks of ability to reach international agreements and common set of basic rules • Policy is made to further industrial growth not regulate it. • Energy security becomes increasingly important and domestic reserves are optimally exploited. •	• Limited competition and participation • Policy agreements of "coalitions of the willing" to reduce greenhouse gas emissions and setting of (increasingly) international standards for carbon pricing • Stronger role for international institutions to set policies • Main focus of energy policy will be to ensure energy crises are averted, economy is shielded from oil shocks, and domestic energy reserves are fully developed. • Energy access at an affordable price becomes main target of energy policy
Policy initiatives	• Policy initiatives aimed at setting framework conditions for market solutions to emerge	• Energy policy initiatives set by centralized government where regulations of energy sector reverts to national states
International cooperation	• Successful international coordination on free market mechanisms	• International coordination of energy taxes progressing
Energy Saving	• Significant saving (higher prices/efficient markets) • Rising electricity prices force industry and domestic consumers to adopt smart-metering and energy saving measures.	• Large government focus on energy efficiency and energy saving programs • Efficiency brands (Like Energy Star) become dominant in consumer minds • Efficiency does not make inroads unless investment made justifies energy savings in monetary terms. • Clean energy mandates are financed by

		• international organisations. • World Bank funds continue to be provided to Asian countries to implement energy efficiency targets.
Energy Consumption	• High economic growth yields high energy consumption	• High impact from energy efficiency and energy saving programs • Global demand for energy is also lower because of lower growth and changes in lifestyle. • Transport Mostly using conventional gasoline and diesel • In 2008, China consumed 65 mtoe (about 1.314 million barrels per day) of gasoline and about 76 mtoe (about 1.546 million barrels per day) of diesel. • In 2008, OECD-Asia consumed 65 mtoe (about 1.314 million barrels per day) of gasoline and about 54 mtoe (about 1.082 million barrels per day) of diesel. • In 2008, rest of Asia's consumed 65 mtoe (about 1.314 million barrels per day) of gasoline and about 84 mtoe (about 1.700 million barrels per day) of diesel. • Passenger and freight transport are up 26 and 29.2 percent in China (2000-2005) • By 2050, china transport fuels consumptions is expected to increase from 150 mtoe to around 700 mtoe (mostly conventional gasoline/diesel/jet fuel). • Similarly, India transport fuels consumptions is expected to increase from 50 mtoe to around 400 mtoe (mostly conventional gasoline/diesel/jet fuel). • However, OECD-pacific transport fuels consumptions is expected to remain at the current level of around 200 mtoe (mostly conventional gasoline/diesel/jet fuel). • Other Asia transport fuels consumptions is expected to increase from 300 mtoe to around 550 mtoe (mostly conventional gasoline/diesel/jet fuel).
Transport Intermodal	• Individual transport solutions • Solutions are more short term and lack wide perspectives • Megacities embark on electrification of public transport systems. • Urban planning becomes more important. • Intra-city rail projects increase.	• Stronger emphasis on public transport • Intermodal transport seen as a crucial part of the solution in China • In India and Indonesia local and regional efforts on public transport around major urban centres appearing until 2025 driven by local visionary politicians • Eventual national solutions developing after 2025; long term solutions with wide perspectives • Electrification does on take place till infrastructure and funding is secured. • Freight within countries remains heavily dependent on road transport. • Exxon estimates that by 2030 HDVs will become the largest transportation demand segment (Energy Outlook, 2009). • Efforts are underway in India to bring intra-city rail systems online, while China has ambitious plans of extending its rail network to 120,000kms with 16,000kms of high speed rail.
Air Traffic/Freight	• High growth of air traffic and freight sector • Aircraft orders increase. • Air links to urban centres within manufacturing hinterlands increase in India and China.	• Less growth due to lower economic growth • Slow to medium growth in Aviation sector. Demand for aircraft will depend on oil prices and ability of governments to meet non-aviation transport demand for oil. • According to International Civil Airline Organization of Member States, civil airline of China became the second largest, next to the US in 2005. • Freight in India is heavily dependent on road transport and also railways. Infrastructure developments in the national highway corridors are being carried out.

		• For the Asia pacific market, Boeing expects a growth rate of 6.8% for passenger and 6.8% for cargo per year thru 2029. • For china the rates are 7.6% for passenger and 7.4% for cargo, • for South Asia it is 7.4% for passenger and 7.7% for cargo, • for northeast Asia it is 4% for passenger and 6.3% for cargo • for south east Asia it is 6.9% for passenger and 6.5% for cargo • for Oceania and Australia it is 6% for passenger and 6.2% for cargo
ICEs	• High efficiency ICEs	• High efficiency ICEs • In 2005, diesel ICEs constitutes about 25% of India's LDV stocks (still gaining popularity) due to the low cost of diesel at the pump compared to petrol. Increasing fuel efficiency, combined with turbocharged technology has boosted the demand for diesel vehicles in India. • Gasoline ICEs have a big demand in China and it will continue to grow. • In 2005, the passenger LDV stock is about 14 million vehicles in China, about 7 million in India, and 26 million in other Asia (total = 47 million). • In 2005, new car sales in China are about 3.1 million /yr, 1.1 million cars/yr in India, and 2.9 in other Asia. • In 2005, used cars inflow to Asia is about 274,000 cars (mostly from Japan) . • Conventional ICEs dominates existing stock/new sales /used sales. • ICE is expected to dominate thru 2050. Small fraction will be fuelled off CTL.
Hybrids	• More hybrids • Hybrid vehicle growth increases in Asian markets.	• moderate hybrids share growth • Hybrid penetration is low in Asia, with the exception of Japan where sales were almost 500,000 units in 2010. • Expected to increase market share in high income countries (Japan/Korea) • In 2009, Japan's sales of hybrid cars were 334,000 and 500,000 in 2010 (now IEA forecasts that there will be about 15-20 million Hybrids by 2020 and about 80 million by 2040.
EVs	• Batteries still expensive. • With time, R&D will drive battery prices down • competitive market facilitate new business models for battery replacement • Oil still a necessity for most transport demand, even in 2050. • Innovation centres in the Eastern markets and mega-cities drive the introduction of large numbers of EVs due to air quality concerns in mega cities. In the longer term, low cost EVs penetrate western markets. • Begins with hybrid spread. Full EV uptake will not occur until 24-hour electricity supply is guaranteed to urban settlements year-round. • EV uptake more likely in China than India. • Road and charging infrastructure crucial. • Electric two wheeler uptake is rapid and exponential in Asian urban centres as well as across rural areas where road infrastructure is less developed	• Earlier penetration of EVs and more use of electricity in public transport fleets (government directed). • Efficiency of electric vehicles transforms energy demand and landscape. However, impact really visible after 2025. By 2050, EV expected to be 40% of the LDVs demand share (extreme case as in IEA's 450 level). This is subject to significant improvement to the grid systems. • Fossil fuels reduced to cover 30% of LDVs transport energy demand in 2050. Remaining 30% is provided by Biofuels and FCs. • Lower OECD transport emission (assuming CCS for power generation) in the long run. • Main emerging economies avoid mistakes of developed world, leapfrogging technologies. • No foreseeable entry in the future, except for government fleets which will be due to government policy. • China may roll out EVs with extensive subsidies and tax breaks (dependent on infrastructure and ability to deal with congestions problems in cities). • Primary uptake countries in Asia are expected to be China, Japan, and Korea (75% of EV purchases in Asian market). • By 2050, EVs are still a small fraction of the fleet (less than 5%). • Electric two wheeler uptake is rapid and exponential in Asian urban centres as well as

		across rural areas where road infrastructure is less developed
CNGs	• More CNGs if gas reserves available as E&P accessible by IOCs	• Governments put CNG infrastructure programs in place as part of the drive to reduce dependency from imported oil and with air quality considerations in mind • CNGs significantly in transport early on by local governments with access to domestic gas reserves. • Potential for CNG vehicles, especially in India, Pakistan and Iran. • CNG vehicles are becoming increasingly popular, estimated at 11.4 million vehicles in 2009 by IANGV. Around 72% of these vehicles are located in Pakistan, Argentina, Brazil, Iran, and India. • CNG vehicles are becoming more popular in India and other countries due to the low cost of CNG per km compared to other fuels. • Still will constitute a small fraction of the total stock.
FCs	• FCs small breakthrough as they are still expensive	• Fuel cells adopted to reduce dependency on foreign oil • Minimum level & potential
Biofuels	• Food crisis depresses global biofuels growth • Strong regional hubs in both North and South America • Gene technology used to grow energy crops (except EU). • 2nd & 3rd generations are still expensive	• Increasing contribution of first generation biofuels to fuel mix • Larger impact on food prices • Gene modifications of crops still not accepted in EU. • Large contribution of second (and 3rd ?) generation biofuels in the long term • Developing Asia is expected to consume 16mtoe (322,000 barrel per day) of biofuels in 2030 (China: 7.9mtoe, India: 2.4mtoe, Indonesia: 1.5mtoe). • Competitive biofuel production can be achieved in SE Asian countries which produce palm oil. Around 3 billion litres of biofuels were produced in Asia in 2008, compared to a world total of 67 billion litres.
Urban Planning	• Good economies will invite better planning and problem solving. • Urbanisation sharply grows and then plateaus as income levels rise in non-urban manufacturing areas (e.g. SEZs). • Number of industrial cities will grow. • Cities begin to grow a more planned manner. • Land and house prices sharply increase, leading to a boom in real estate businesses.	• Governments alone can poorly direct/coordinate urbanisation • Coalitions of local and regional governments and multi-lateral institutions providing financing and project management expertise inviting private sector consortia to undertake large urban re-development projects to improve worst problem areas • Urbanisation continues to grow sharply as more and more rural inhabitants move to cities in search of work to meet higher costs of living. • Unplanned expansion of urban settlements, particularly in India. • Population density in Asia is about 90 people/sq km and expected to grow. • In 2000, around 48% of the Asian populations live in cities. Around 30% of the Indian population lived in urban centres while in china it is around 44%. These rates are set to increase. • Rural to urban influx is also increasing in China and India. Internal migration is rising; 1 in 5 respondents to the last census has relocated. Bohai Economic Rim, with a series of urban centres located in the industrial hinterland surrounding Beijing and Tianjin is being developed.
High Speed rails	• There could be problems with corridors and private sector funding.	• Penetration of high speed rail networks at a larger scale, especially in second half of scenario period • Move towards electrifying railways • China leads the world with 4,840 km in operation and 15,478 km under construction. • China plans form more than 12,000 km by 2020. • Recent HSR accidents may not slow down the government plans.

		• Japan has a total of 2,495 km of HSR, Taiwan – 345 km, South Korea – 412 km.
Vehicles Ownerships	• More vehicles ownerships • Number of two wheelers increasing significantly	• Less car ownerships & more reliance on public transport systems, car sharing and rentals. • In 2005, the vehicle ownership in China was about 11 cars per 1000 capita and 6 cars per capita in India compared to a global average of 111 cars per 1000 capita. Still very long way to go. • In China ownership rate has been growing at the rate of 12% per year, in India it has been growing at 9% per year. In Beijing, number of new cars rose by 23.8% in first four months of 2010. • Asia produces 95% of the global 2-3 wheelers and constitutes 75% of the stocks in the world. • China is the fastest growing but still within 50-100 per 1000 capita (still below Malaysia and Thailand, 250/1000 capita). • Electric bikes cost 505 less than motor scooters and about 30% of the conventional ones. • China banned gasoline motorcycles and scooters in Beijing and Shanghai. • 100 million E-bikes in circulation in china. Sales 20 million/year. • France/US are on the path of china for E-Bikes.
Aviation, Shipping, Rails & Trucks	• High growth for both passenger travels and freight especially in eastern markets.	• More moderate growth levels. • Over the next 20 years, overall Asia-Pacific freighter fleet is expected to grow five-fold, rising from 16% of global fleet to almost 40%. Airbus expects India's fleet to grow 13.5 times by 2028. • Over the next 20 years, Boeing expects the Asia Pacific passenger fleet to grow by three fold from 4110 planes to 12200 planes. • India needs 3000 additional aircraft over the next decade to maintain economic growth. • Chinese investment in air infrastructure over ten years is planned to be US$64 billion (100 new airports). India has earmarked US$ 7 billion for airport expansion over next 5 years. • China plans to invest US$ 1trillion to expand its rail network by 2020.

3- Europe & Russia

Issue	1-Freeway	2-Tollway
General	• World with solutions where pure market forces prevail	• Regulated world where governments and politicians decide to put common interests at forefront and intervene in markets
Trade	• WTO makes progress competitive issues??? • Free and expanding international trade in regard to trade & barriers removals. • Globalized economy • Global competition and occasional trade disputes • High global trade imbalances • Stronger trade links between Russia (gas), CIS (gas & oil), and Asian (manufacturing) countries. • Euro regains potential after resolution of PIIGS crisis. • US remains strongest trading partner.	• WTO shows increased emphasis on free flow of green goods and services • Increased international cooperation on climate change issues in the short to medium term. • Individual countries/regions preferring local content and solutions • More fragmented and /differentiated global economy • More trade restrictions due to regional concerns • Trade is mainly focussed on servicing US market. • Formation of a Eurasian Economic Union under the leadership of Russia (potential for EU to be polarized into West vs. East trading partners). • SE Europe will be increasing influenced by GCC trade investments in the region.
International Institutions	• Less prominent international institutions	• Stronger role for international and multilateral institutions
FDI	• Increased level of FDI	• Same or less • Increased national investments
Technologies	• Technological innovation market driven • Emerging innovation centres attracting and competing for investment capital and human resources • Original Equipment Manufacturers (OEM) develop transport solutions most wanted by	• Governments picking technology winners (e.g. photovoltaic) • Higher amount of technology transfer into developing nations • Multinational technology co-operation and initiatives

	consumers • Continued R&D on renewables technology.	• More state subsidies sponsor focused research programs into new transport technologies • Focus on renewables R&D is limited to a gropup of countries called the planet pioneers, e.g. Germany, Denmark, UK etc.. •
Capital & Labour	• Free flow of capital & labour • No shortage of capital as economic growth rebounds. • Investment is provided by International Banks and carefully monitored by central banks (new EU banking code)	• Restricted flow of capital & labour • Highly dependent on ability of Euro zone to stabilize currency and common central banking codes are strictly adhered to. • Labour from Eastern Europe continues to flow into NW Europe to benefit from open borders and better social programs. • Remittances into Eastern Europe, especially Poland drive economic development.
Manufacturing centres	• Manufacturing established in low cost centres & close to major markets • Increasingly manufacturing shifts to the East of Europe	• Manufacturing established in less optimal locations but with regional development and factors in mind
Infrastructure	• Patch work of improvements in many regions • In order to meet 20-20-20 target, EU aims to accomplish the following: • Connect offshore grids in Northern Seas to consumption centres in C. Europe. • Roll out smart grid technologies. • Diversify gas southern corridor: bring gas in from Caspian Basin, Central Asia, and Middle East. • Baltic Energy Market Interconnection Plan (BEMIP). • Linking Baltic, Black, Adriatic, and Aegean Sea via BEIMP and North-South gas corridor. • Reinforcing Cen. European pipeline network. • Commission first Electricity Highways by 2020. • EUR 200 billion needs to be invested until 2020 to meet objectives • Existing EU-Russia transport infrastructure is old will be very expensive to replace-modernize	• New infrastructure projects, mainly in renewable energy and public transport, state funded • Access to energy and public transport schemes in Africa and developing Asia are being promoted by international institutions (UNIDO) • EDU starts the planning, design and implementation of the European super-grid, a high voltage network that is centrally run and co-ordinated • New European agency to run EU grid established
Climate change	• Commercially viable Innovative Green technologies/practices flourish • EU 20-20-20 target	• Big focus and international efforts on climate change by governments in short, medium to long terms.
Politics & competition for resources	• Pure competition creates cost-efficient solutions • Higher demand creates global competition for resources • Region is politically stable, although financial crises have lent instability to Ireland, Portugal, Italy, and Greece. • Green Parliamentary Group in the Bundestag has come to dominate German politics – all renewable energy by 2030. • Russia continues demonstrating its fears from NATO. • Instabilities continues in the southern Russian old states (Chechen Republic), Northern Spanish province of Basque, and Northern Ireland	• Less competition over energy resources • Focus on regional supply and energy efficiency reduce competition for resources
Regulation	• Low government regulation (minimum regulated environment) • Occurs at the EU-level, which members states have to eventually adopt. • Russia is still heavily regulated.	• High government regulation (fully regulated environment) • EU-level regulators for gas and electricity markets. • EU-level regulation becomes bigger not necessarily stronger. •
Competitive	• Pure market forces • Market seeks competitive cost solutions • Favourable climate for open global competition	• Same or less market influence • Market distortions through government intervention
Privatization, liberalization, deregulation	• Wave of privatization, liberalization & deregulation • Potential for private operation of transnational pipelines • OECD Europe countries have fully liberalized markets. Non-OECD Europe countries will	• Same level or less • Energy and transport sector considered strategic in most countries • Move towards privatization of energy companies in PIIG countries.

	eventually privatize non-performing public assets, especially in light of financial crisis. • Privatization is still an issue in Russia.	
Economic Volatility	• High economic volatility • Potential super-cycles	• More stable economic environment at lower growth levels in the short term.
Wealth	• High & increasing wealth in western world & successful new industrial (SE Asia & LAC). • Africa still marginalized. • Germany remains the most productive economy in Europe. • Strong growth of Eastern European economies. • In 2010, the GDP per capita for the Euro area was about $32,772 and for Russia, it was about $8,684 •	• Wealth disparity is less obvious in industrial countries • Africa improving due to technology transfer (e.g. Copenhagen accord) and multi-lateral programs (e.g. UNIDO access to energy program). • Affected by non-resolution of EU currency crisis. • Unemployment issues will need to be addressed by job creation instead of clamping immigration. • Middle classes continue to get squeezed leading to demand for political reform.
R&D	• Diverse R&D efforts • Driven by both private and public sectors • Countries like Germany, UK, and Italy continue to be centres of innovation.	• More focused R&D programmes driven mainly by public sector • International research programs and technology "clearing houses" to facilitate technology transfer.
Carbon pricing	• Efficient carbon price mechanisms • Most developed carbon market worldwide.	• Existing Clean Development Mechanisms (CDMs) may fail in EU-US and not take off in other markets • Regional limits and penalties imposed by local governments. • Set of regional agreements on climate change and introduction of carbon price mechanisms. • International incentives for countries to join, through investment funding and technology transfer system. • Does not reach to the Freeway level.
Sustainability	• Cheaper but less wide-spread solutions	• More expensive sustainability (as efficient prices are not driving players actions) but faster implementation
Consumer behaviour & lifestyle	• Consumer spending increases, savings drop • Individual interests dominate • Cheapest price and highest comfort dominate and differentiate products • Demand for green goods and services rises. • Public opinion influenced by virtual communities. • Increased use of personal gadgets and communication devices. • Increased monitoring capability of personal energy consumption • In 2008, primary energy consumption for OECD Europe was 1,820 Mtoe and 1,386 Mtoe for non-OECD Europe. • Energy intensity has been steadily falling year on year (primarily due to efficiency increases). In 2035, it is expected to increase to 1,843 Mtoe for OECD. • In 2007, biggest energy consumers of energy included Germany (339.6 Mtoe), France (270.3 Mtoe), UK (221.1 Mtoe) and Spain (146.8 Mtoe). • EU-27 Energy Consumption figures in 2007 were Oil 36.4%, Gas 23.9%, Solid fuels 18.3%, Nuclear 13.4%, Renewables 7.8%. • In 2008, the expenditure per head on transport for EU-27 is around EUR 1,900.	• Consumer spending decreases, saving increases • Common interests at forefront • Consumer power used to stimulate development of greener goods and services • Social activism increases and forces producers and governments to put common interests at forefront • Best public image and corporate responsibility differentiate in addition to price • Drive towards increased virtual interconnectedness continues. • Trust in government and financial institutions very low, increased political uncertainty. • Intra-EU movement decreases.
Good Economic Situation-Top of Business cycle	• High but uneven distributed economic growth. • Sufficient fund for new private investments. •	• Sufficient economic performance to fund government initiatives in energy. • Overall economic growth is more moderate. Still distributed unevenly across regions.
Bad Economic Situation-Bottom of Business cycle	• Low & uneven distributed economic growth. • Wide spread austerity packages reducing new investments and energy demand. • Between 1990 and 2008, the EU grew by 2.2%/year while Russia grew by 0.6% a year. • In 2010, the inflation of avg. consumer prices in was about 2%. • Average unemployment rate is about 9.3%	• Still sufficient economic performance in developing countries (shielded such as China & Brazil). Much weaker in developed. Still distributed unevenly. • Large public sector debt developing. • Effect of down-cycle partially mitigated by lower energy demand and import bills due to energy efficiency gains.

	• Growth in EU zone will be slowed down by the debt crises hitting Greece (net debt of 125% of its GDP), Italy (net debt of 101% of its GDP), Belgium (net debt of 80% of its GDP), Portugal (net debt of 75% of its GDP), and Ireland (net debt of 70% of its GDP). • It is widely expected that Greece will default in paying its loans and will expose many European banks (mainly French). • Austerity measure will also slow down growth in the EU zone. • Thru 2035, The WB expects EU to grow at 1.6% a year while Russia to grow at 3%.	
Population	• In 2008, the Europe's population stood at around 723 billion. The current population growth is about -0.1% per year for Russia and 0.4% per year for the EU. • Most of the EU's population growth is in Northern EU (0.58%/year). • Germany, Hungary, and UK experienced negative population growth rate in 2010 • Around 15% of the Russian population is below 14 years old while for Eu it is about 17%. • Over the last decade EU-25 dependency ratio grew by 1.3% per year and reached 25% in 2005. • Low fertility rates (1.5 children per woman) and high life expectancies are accelerating the demographic decline. • Thru 2035, Russia's population is expected to grow at 0.4% and per year while the EU's population is expected to grow by 0.2% a year.	
Finance	• Private Financing capital available, abundant and easy to flow • Wide options of financing options.	• More Limited private financing capital mostly by local institutions • Large public sector funding for infrastructure and "green" projects
Corruption	• Could lessens in many regions • Minimum in West EU but very high for East EU Russia (second to South Asia).	• Tops list in South Asia, Sub-Saharan Africa, transition economies.
Bureaucracy	• Lessens in many regions • Considerable at the EU-level. • Member states effectively implement national policies.	• Remains an issue everywhere.
Tax regulation	• Taxes (as a market distortion) drops in many regions • Minimum VAT rate at EU level for energy products 15%. • Denmark, Hungary, and Sweden have highest VAT rates of 25%. • Highest excise rates for Euro Super 95 – Netherlands (EUR 700/1000 litres), UK (EUR 684/1000 litres), Germany (EUR 670/1000 litres) • Tax regulations still a concern in most OECD countries. •	• Constitutes a severe constraint on OECD and post socialist transition economies. • New taxes needed to finance large public sector debt in Western economies
Subsidies	• Subsidies (as another market distortion) removed in many regions. Remaining subsidies mainly in renewables. • In 2001, energy subsidies in EU-15 estimated at EUR 29 billion. 43% was for solid fuels, 30% for Oil and Gas, 19% for Renewables, and 8% for Nuclear. • EU average annual subsidies for fossil fuels accounted for almost 75 % of total EU energy subsidies. • Italy, the Netherlands and the United Kingdom provide the highest level of support to the oil and gas sector. In the Netherlands, preferential tax treatment under the regulatory energy tax for medium and large users of gas is significant (estimates range from EUR 0.9 to 2.4 billion). The United Kingdom supports oil and gas with	• Subsidies remain and increase for green goods and services.

	reduced rates of VAT (5 %) on domestic oil and gas (EUR 1.4 billion), while Italy allows reduced VAT rates (10 %) on domestic gas (EUR 0.9 billion). • Subsidies are significant in Russia too.	
Energy E&P	• Many countries open their upstream sectors resulting in a surge of supply. • Moderate oil prices in the short term. • More security of supply and demand • Fossil fuel dominance reducing only gradually • High growth of energy demand, leading to higher prices at the end of scenario period. • Industrial demand for energy reaches all time peak • Electricity prices increasing sharply, leading to energy poverty • Russia becomes largest supplier of gas to EU. • Middle East predominant in oil supply. • Azerbaijan contribution to gas increases. • Electricity infrastructure for unified EU-25 grid is put in place. • Creation of common European power trading hub. • Gas pipelines (Nabucco & South Stream are achieved, North-South gas corridors) are developed. • Adriatic, Aegean, Black, and Baltic seas are linked. • Strategies to link into Central Asia reserves. • EU as a whole remains heavily dependent on Russian gas supplies. This dependence is expected to last for few more decades especially in light of the current move away from nuclear (Germany)	• Lack of opening new areas for E&P leading to tight supplies • High infrastructure costs for early integration of renewable energy sources • higher oil and energy prices at the beginning of scenario period, but lower, more stable prices after quicker transition to renewable energy sources • Oil price is tightly regulated • Security of supply and climate change concerns push drive to reduce dependence from fossil fuels • Clean coal and CCS socially unacceptable in EU and US but becomes a must for developing world • Electricity prices increasing sharply, leading to energy poverty and government subsidies for lower incomes • Domestic fossil fuel reserves are developed. • Energy supply is wielded as a trump card by producer countries. • Poland and other developing EU nations concentrate on developing fossil fuel reserves, along with unconventional sources. • Gas pipeline development moves towards regionalisation instead of EU-wide level. • Formation of regional energy/electricity trading blocs. •
Liberalization, policy agreements	• Liberalized energy markets and high competition for resources on a global basis • Easy to reach international agreements on removing trade barriers • No agreements on international energy policy due to competing interests. • Energy market lacks of ability to reach international agreements and common set of basic rules	• Limited competition and participation • Policy agreements of "coalitions of the willing" to reduce greenhouse gas emissions and setting of (increasingly) international standards for carbon pricing • Stronger role for international institutions to set policies
Policy initiatives	• Policy initiatives aimed at setting framework conditions for market solutions to emerge • Becomes predominantly focussed on drive to renewables. •	• Energy policy initiatives set by centralized government where regulations of energy sector reverts to national states • Mainly focussed on providing cheap energy for domestic consumption. •
International cooperation	• Successful international coordination on free market mechanisms	• International coordination of energy taxes progressing
Energy Saving	• Significant saving (higher prices/efficient markets) • Credits are given to households for saving energy.	• Large government focus on energy efficiency and energy saving programs • Efficiency brands (Like Energy Star) become dominant in consumer minds • Energy efficiency targets become compulsory for industry. • Governments undertake energy efficiency targets.
Energy Consumption	• High economic growth yields high energy consumption • Gas becomes the transition fuel. • Oil link is still strong for transport (depending on battery storage technology breakthrough). • In 2008, the OECD Europe transportation market is dominated by gasoline, diesel, and jet fuel. It consumed 102 mtoe (2.1 million barrels per day) gasoline and 199 mtoe (4.02 million barrels per day) diesel. • Similarly, non-OECD Europe and Russia transportation markets are dominated by gasoline, diesel, and jet fuel. They consumed 56	• High impact from energy efficiency and energy saving programs • Global demand for energy is also lower because of lower growth and changes in lifestyle. • Increasing use of coal and gas in power generation. • Renewables may reach full scale as envisioned in 20-20-20 targets. • CCS projects slowly accepted in some countries, but not across the whole of the EU

	mtoe (1.1 million barrels per day) gasoline and 31 mtoe (0.62 million barrels per day) diesel. • By 2050, all OECD Europe, Eastern Europe, and Russia are expected to remain almost at the current fuel consumption levels of 450 mtoe, 100 mtoe, and 80 mtoe respectively. • Significant gains in fuel efficiency.	
Transport Intermodal	• Individual transport solutions prevail • Solutions are more short term and lack wide perspectives • Roll out of hybrid buses in other parts of Europe. • Large emphasis on improved consumption for ICEs • New car models with reduced weight and very low fuel consumption levels, 3l to 1l engines seen as the best way forward to reduce emissions from transport • 2008 modal split: Road – 45.9%, Rail – 10.8%, Inland waterways – 3.6%, Pipelines – 3%, Sea – 36.6%, Air – 0.1%	• Stronger emphasis on public transport • Solutions are long term with a wide perspectives • Increasing share of hybrid. • Large scale electrification of public transport in NW Europe.
Air Traffic/Freight	• High growth of air traffic and freight sector • Increase is moderate compared to Asian demand. • Focus on decarbonising air travel viause of different fuels and technologies. • Freight (tkm) level dropped off sharply in 2007 due to recession. Recovery in progress, yet to reach pre-2007 levels. Annual growth rate (2000-2008) in freight transport has been 2%.	• Less growth due to lower economic growth and the emergence of long distance high speed train systems in some EU countries
ICEs	• High efficiency ICEs • In 2005, diesel ICEs constitutes about 30% of OECD's LDV stocks (still gaining popularity). • In 2005, cars stocks stood at 228 million in OECD Europe, 18 millions in east Europe and 29 millions in Russia. • In 2005, new car sales 16 millions in OECD Europe, 1.4 million in east Europe and 2 millions in Russia. • In 2005, about 701,000 used cars were shipped from Western Europe to Eastern Europe while about 347,000 cars were shipped from Japan to Former USSR. • All new and old sales and existing stocks are dominated by conventional ICEs. • The ICEs will remain dominant.	• High efficiency ICEs • ICEs continue to dominate.
Hybrids	• More hybrids • In 2010, Europe had sales of only 110,000 hybrid cars. • IEA forecasts that there will be about 15-20 million Hybrids by 2020 and about 80 million by 2040.	• moderate hybrids share growth
EVs	• Batteries still expensive. • With time, R&D will drive battery prices down • competitive market facilitate new business models for battery replacement • Oil still a necessity for most transport demand, even in 2050. • Innovation centres in the Eastern markets and mega-cities drive the introduction of large numbers of EVs due to air quality concerns in mega cities. In the longer term, low cost EVs penetrate western markets. • Small scale rollout of electricity transport in Germany and Switzerland. • Reaches medium scale. Highly dependent on grids reaching dynamic flexibility and availability of charging infrastructure. • ICEs may still dominate if performance of EVs disappoint • Minimum	• Earlier penetration of EVs and more use of electricity in public transport fleets (government directed). • Efficiency of electric vehicles transforms energy demand and landscape. However, impact really visible after 2025. By 2050, EV expected to be 40% of the LDVs demand share (extreme case as in IEA's 450 level). This is subject to significant improvement to the grid systems. • Fossil fuels reduced to cover 30% of LDVs transport energy demand in 2050. Remaining 30% is provided by Biofuels and FCs. • Lower OECD transport emission (assuming CCS for power generation) in the long run. • Main emerging economies avoid mistakes of developed world, leapfrogging technologies. • Reaches medium scale. Highly dependent on grids reaching dynamic flexibility and availability of charging infrastructure.

	• Largest market expected to be Germany having 25% of EU EV market, France will have 20%, while the UK & Italy will have 15%.	• EV penetration only in pockets – Germany, Sweden, Switzerland. • Roll out of test fleets in select cities on a limited scale. • EVs a phenomenon of upper middle class but does not reach the majority of populations until 2025 due to high costs
CNGs	• More CNGs if gas reserves available as E&P accessible by IOCs • Small	• CNGs significantly in transport early on by local governments with access to domestic gas reserves.
FCs	• FCs small breakthrough as they are still expensive	• Fuel cells adopted to reduce dependency on foreign oil
Biofuels	• Food crisis depresses global biofuels growth • Strong regional hubs in both North and South America • Gene technology used to grow energy crops (except EU). • 2nd & 3rd generations are still expensive • EU biofuels production in 2009 was 178 kb/d (about 17% of the global), mostly biodiesel (110,000 b/d and bioethanol 46,000 b/d). • IEA expects OECD Europe biofuels consumption to be 0.97 million b/d (in the optimistic 450 Scenario) and non-OECD EU to be 0.11 million b/d. • EU RE Directive 2009/28/EC requires GHG savings of at least 35% from end of 2010 – currently, emissions savings are well below this. • EU support for biofuels in 2009 was US$ 7.9 billion; largest share was biodiesel in Germany.	• Increasing contribution of first generation biofuels to fuel mix • Larger impact on food prices • Gene modifications of crops still not accepted in EU. • Large contribution of second (and 3rd ?) generation biofuels in the long term
Urban Planning	• Good economies will invite better planning and problem solving. • Not much change in NW Europe. • Eastern Europe and SE Europe experiences increasing urbanisation. • Land use may feature greenhouse plantation farming to maintain food security in face of increasing food consumption in producer countries. • Around 73% of Europe's (Russia/EU) population is urban • Population density is about 119 persons/sq km for EU and about 9 persons/sq km for Russia.	• Governments alone can poorly direct/coordinate urbanisation • Problems worsen with tight government budgets and bad economies. • Prospecting for unconventional receives a boost. • Urbanisation grows especially in countries with low economic growth. • EU agricultural subsidies continue.
High Speed rails	• There could be problems with corridors and private sector funding. • 23.9% of total EU-27 rail network is HSR, at 97.6 million passenger km or 6,178 km (EU) • 12 HSR lines currently under construction. • Russia is lagging behind.	• Penetration of high speed rail networks at a larger scale, especially in second half of scenario period
Vehicles Ownerships	• More vehicles ownerships • In 2005, OECD Europe stands at a vehicle ownership level of 424 cars/1000 capita, Eastern Europe at 149/1000 capita and Russia at 134/1000 capita. •	• Less car ownerships & more reliance on public transport systems, car sharing and rentals.
Aviation, Shipping, Rails & Trucks	• High growth for both passenger travels and freight especially in eastern markets. • Dominated by road (45.9% of tkm in 2008), followed by rail (10.8%), waterways (3.6%). • In 2008, the value of EU sea trade (both Export & Import) was about EUR 1.4 trillion (air: EUR 576 billion, road: EUR 476 billion, rail: EUR 46.1 billion) • Highest number of commercial freight vehicles in the world: 33.97 million (2008). • Thru 2029, Boeing expects the air freight to increase by 4.4% a year while the passenger will increase by 5%. In the CIS, Boeing expects an air freight growth of 4.8% and a passenger growth of 5.7% a year. • Boeing also expects that air fleet in Europe to increase from 4300 airplanes to 7460 planes by	• More moderate growth levels.

	2029. In CIS, it expects an increase from 1150 to 1300.	

4- North America

Issue	1-Freeway	2-Tollway
General	• World with solutions where pure market forces prevail	• Regulated world where governments and politicians decide to put common interests at forefront and intervene in markets
Players	• Private sector leads • Global companies emerging as central players • Entrepreneurs • Consumers	• Public sector leads • Local Governments acting as central planners • NGOs • Citizens
Trade	• WTO makes progress competitive issues??? • Free and expanding international trade in regard to trade & barriers removals. • Globalized economy • Global competition and occasional trade disputes • High global trade imbalances • Increasing trade with Asia – commodities, manufacturing • Trade with EU is knowledge based – high-tech industries • Trade with LAC is resource based	• WTO shows increased emphasis on free flow of green goods and services • Increased international cooperation on climate change issues in the short to medium term. • Individual countries/regions preferring local content and solutions • More fragmented and /differentiated global economy • More trade restrictions due to regional concerns • Most dominant trading partner is EU • Trade with China remains at expected growth level
International Institutions	• Less prominent international institutions • US institutions supersede international institutions	• Stronger role for international and multilateral institutions • International institutions influence US policy
FDI	• Increased level of FDI • FDI outflows to Asia and LAC • Chinese investment in US grows further	• Same or less • Increased national investments • FDI flows decrease, including foreign aids
Technologies	• Technological innovation market driven • Emerging innovation centres attracting and competing for investment capital and human resources • Original Equipment Manufacturers (OEM) develop transport solutions most wanted by consumers • Technologies are integrated into ITES (information technology enabled services) sector • Carbon mitigation technologies become popular • Lower growth in "clean energy" sectors, e.g. wind, solar, tidal	• Governments picking technology winners (e.g. photovoltaic) • Higher amount of technology transfer into developing nations • Multinational technology co-operation and initiatives • More state subsidies sponsor focused research programs into new transport technologies • R&D into renewables technology is funded by government and international grants. • Consortiums fund research into breakthrough technologies • Attempts to bring new renewable technologies to scale, especially via international funding. • Growth in "clean energy" technologies
Capital & Labour	• Free flow of capital and labour	• Restricted flow of capital & labour
Manufacturing centres	• Manufacturing established in low cost centres & close to major markets • Outsourcing of manufacturing to Asian countries continues.	• Manufacturing established in less optimal locations but with regional development and factors in mind • Rise in domestic manufacturing • Overall manufacturing output falls due to higher costs of production • Government subsidies increase for domestic industries
Infrastructure	• Patch work of improvements in many regions • Investment flows into sectors where demand is high • Oil pipeline infrastructure (from Canadian oil sands) and shale gas technologies increasing become targets of infrastructure investment. • High level of infrastructure. • Gas network is fully developed in US. • Efforts are on to link Canadian oil sands to US ports and refineries via pipelines. • Over the next 20 years, Boing expects the number of passenger planes to increase from 6590 to 9000.	• New infrastructure projects, mainly in renewable energy and public transport, state funded • Access to energy and public transport schemes in Africa and developing Asia are being promoted by international institutions (UNIDO) • Targeted investment in non-fossil fuel forms of energy – mostly wind, solar, and biofuels. • Associated investment costs in grid upgrades and additional required infrastructure is heavily supported by governments. • Overall investment levels are lower compared to Freeway Scenario
Climate change	• Commercially viable Innovative Green technologies/practices flourish	• Big focus and international efforts on climate change by governments in short, medium to long

	• Remain high on the list for the current US govt.	terms.
Politics & competition for resources	• Pure competition creates cost-efficient solutions • Higher demand creates global competition for resources • Full potential of domestic fossil-fuel reserves are developed • Increasing oil and mineral flow from LAC to US • Stable region. • US increasingly characterised by bipartisan politics, which will lend an element of uncertainty to long term energy policies.	• Less competition over energy resources • Focus on regional supply and energy efficiency reduce competition for resources • Oil sands and shale gas do not reach full maturity and are curtailed because of environmental impact concerns • Continued reliance on oil imports, gas imports may also begin to creep up in the future
Regulation	• Low government regulation (minimum regulated environment) • Focus on increasing energy efficiency and boosting renewables contribution under Obama presidency. • Canada continuing to develop oil sands with international players.	• Relatively higher government regulation , but still much lower than in Europe and other parts of the worldery strong support for renewables technology at state level • Framework support for renewables and climat change mitigation on national level
Competitive	• Pure market forces • Market seeks competitive cost solutions • Favourable climate for open global competition	• Same or less market influence • Market distortions through government intervention
Privatization, liberalization, deregulation	• Wave of privatization, liberalization & deregulation • Environmental regulation in place, but not very strong • Fully liberal markets.	• Same level or less • Energy and transport sector considered strategic in most countries • Strong regulatory forces
Economic Volatility	• High economic volatility inside and outside business cycles • Potential super-cycles	• More stable economic environment at lower growth levels in the short term. • Long period of low growth, bordering on recession levels
Wealth	• High & increasing wealth in western world & successful new industrial (SE Asia & LAC). • Africa still marginalized. • Canadian wealth grows • Unemployment is expected to fall over the next 5 years. • Current US unemployment rate: 9.2% • US and Canada together account for 40% of World GDP in 2010. World Real GDP (PPP) in 2010 was US$ 37.2 trillion. • US gross debt (annual) as a % of its GDP is expected to rise over next 2 years (now the net debt stands at 75% of its GDP). • GDP per capita are $45,989 for US, $39,599 for Canada and $8,143 for Mexico. World: $ 8,599(current US$, 2009 figures, World Bank) •	• Wealth disparity is less obvious in industrial countries Africa improving due to technology transfer (e.g. Copenhagen accord) and multi-lateral programs (e.g. UNIDO access to energy program). • Falling incomes in US • Canadian wealth grows, but at lower levels that in Freeway scenario.
R&D	• Diverse R&D efforts • Driven by both private and public sectors • Mainly driven by private sector • Innovation hub (especially USA). • Lot of activity around developing new technologies, especially electric transport	• More focused R&D programmes driven mainly by public sector • International research programs and technology "clearing houses" to facilitate technology transfer.
Carbon pricing	• Efficient carbon price mechanisms • Trading is only due to government support and policy • Some form of carbon legislation (not very strong)	• Existing Clean Development Mechanisms (CDMs) may fail in EU-US and not take off in other markets • Regional limits and penalties imposed by local governments. • Set of regional agreements on climate change and introduction of carbon price mechanisms. • International incentives for countries to join, through investment funding and technology transfer system. • Carbon market is small • Mandated carbon reduction/fuel efficiency targets • Trading is due to international and national agreements
Sustainability	• Cheaper but less wide-spread solutions	• More expensive sustainability (as efficient prices are not driving players actions) but faster

		implementation
Consumer behaviour & lifestyle	• Consumer spending increases, savings drop • Individual interests dominate • Cheapest price and highest comfort dominate and differentiate products • US per capita energy consumption in 2009 was 7 tons of oil equivalent, Canada per capita energy consumption in 2009 was 7.4 toe, World per capita energy consumption in 2008 was 1.8 toe. • US energy consumption has been declining since 2000. • OECD North America has the highest passenger travel per capita. • Vehicle kilometres per licensed driver in US (2006): 23,779 km	• Consumer spending decreases, saving increases • Common interests at forefront • Consumer power used to stimulate development of greener goods and services • Social activism increases and forces producers and governments to put common interests at forefront • Best public image and corporate responsibility differentiate in addition to price
Good Economic Situation-Top of Business cycle	• High but uneven distributed economic growth. • Sufficient fund for new private investments. •	• Sufficient economic performance to fund government initiatives in energy. • Overall economic growth is more moderate. Still distributed unevenly across regions.
Bad Economic Situation-Bottom of Business cycle	• Low & uneven distributed economic growth. • Wide spread austerity packages reducing new investments and energy demand. • • Historically, the economic growth rates for US and North America were about 2.8% year. • Thru 2035, the IEA expects US and north America GDP to grow at 2.2%.	• Still sufficient economic performance in developing countries (shielded such as China & Brazil). Much weaker in developed. Still distributed unevenly. • Large public sector debt developing. • Effect of down-cycle partially mitigated by lower energy demand and import bills due to energy efficiency gains.
Population	• In 2008, the North America population stood at around 447 billion (US is about 310 while Mexico is about 110). The current population growth is about 1.3% for Canada, 1% for US, and 0.9% for Mexico. • Around 17% of the Canadian population is below 14 years old, us is about 20% while Mexico is about 29%. Mexico got only 6% of the population above 65 years while both Canada and the US, it is about 13%. • Thru 2035, both the USA population and North America population are expected to grow at 0.7%per year. • US Census Bureau projects US to be world's third most populous nation through 2050 behind India and China (US population in 2050 will be around 423 million).	
Finance	• Private Financing capital available, abundant and easy to flow • Loans for renewable energy projects will require political regulatory certainty • Credit sources are available.	• More Limited private financing capital mostly by local institutions • Large public sector funding for infrastructure and "green" projects
Corruption	• Could lessens in many regions • Minimum	• Tops list in South Asia, Sub-Saharan Africa, transition economies.
Bureaucracy	• Lessens in many regions • • Moderate. • Increased focus on drawbacks of offshore drilling after Gulf of Mexico spill. • Shale gas exploration also affected by EPA findings and state rulings. •	• Remains an issue everywhere. • Projects will need to clear more regulatory hurdles than before – higher costs, longer times
Tax regulation	• Taxes (as a market distortion) drops in many regions • Taxes fall if Republican • Taxes fall then rise if Democrat • • US Excise Taxes on Motor Fuels (2009): Gasoline: 18.4 cents/gallon, Diesel: 24.4 c/gallon, Gasohol: 18.4 c/gallon, CNG: 18.3 c/gallon, LNG: 24.3 c/gallon, LPG: 18.3 c/gallon • In General, taxes remain high in OECD countries	• Constitutes a severe constraint on OECD and post socialist transition economies. • New taxes needed to finance large public sector debt in Western economies • Inability to fund basic government commitments eventually forces US government to revamp tax system and raise taxes against strong opposition of parts of US society

Subsidies	• Subsidies (as another market distortion) removed in many regions. Remaining subsidies mainly in renewables. • • US Federal subsidies for energy have more than doubled since 1999. In 2007, govt. spending on energy subsidies was US$ 16.6 billion (Renewables: $4.8 bn, End use: $2.8bn, Refined coal:$ 2.3 bn, NG & Petroleum liquids: $2.1bn, Nuclear: $1.2bn, Electricity:$ 1.2bn, Coal:$ 0.9bn, Conservation:$ 0.9bn) • Canada spent CAD 1.4bn on oil and gas subsidies. Increase in subsidies between 1996-2000 was 33%. Expenditure on oil sands from 1996-2002 was CAD 1.2bn. (Source: Pembina)	• Subsidies remain and increase for green goods and services.
Energy E&P	• Many countries open their upstream sectors resulting in a surge of supply. • Moderate oil prices in the short term. • More security of supply and demand • Fossil fuel dominance reducing only gradually • High growth of energy demand, leading to higher prices at the end of scenario period. • Industrial demand for energy reaches all time peak • Electricity prices increasing sharply, leading to energy poverty • US prospecting of shale gas plays and Canadian development of oil sands continue to surge ahead • Reduced reliance on oil and gas imports • Increasing WTI-Brent spread • Deep water and Arctic oil E&P • • Shale plays continue to be developed in the US, with increasing focus on developing liquid plays. • Canada is developing its oil sands to full potential.	• Lack of opening new areas for E&P leading to tight supplies • High infrastructure costs for early integration of renewable energy sources • higher oil and energy prices at the beginning of scenario period, but lower, more stable prices after quicker transition to renewable energy sources • Oil price is tightly regulated • Security of supply and climate change concerns push drive to reduce dependence from fossil fuels • Clean coal and CCS socially unacceptable in EU and US but becomes a must for developing world • Electricity prices increasing sharply, leading to energy poverty and government subsidies for lower incomes • Imports of oil and gas remain steady & could grow
Liberalization, policy agreements	• Liberalized energy markets and high competition for resources on a global basis • Easy to reach international agreements on removing trade barriers • No agreements on international energy policy due to competing interests. Energy market lacks of ability to reach international agreements and common set of basic rules	• Limited competition and participation • Policy agreements of "coalitions of the willing" to reduce greenhouse gas emissions and setting of (increasingly) international standards for carbon pricing • Stronger role for international institutions to set policies • International consensus on carbon mitigation, higher energy efficiency, and increased roll-out of green technologies is reached.
Policy initiatives	• Policy initiatives aimed at setting framework conditions for market solutions to emerge	• Energy policy initiatives set by centralized government where regulations of energy sector reverts to national states
International cooperation	• Successful international coordination on free market mechanisms	• International coordination of energy taxes progressing
Energy Saving	• Significant saving (higher prices/efficient markets)	• Large govt focus on energy efficiency and energy saving programs • Efficiency brands (like Energy Star) become dominant in consumer minds
Energy Consumption	• High economic growth yields high energy consumption • In 2008, North America transportation market is dominated by gasoline, diesel, and jet fuel. It consumed 448 mtoe (9 million barrels per day) gasoline and 169 mtoe (3.4million barrels per day) diesel. • US consume 19.15 Mbpd of petroleum. Transport accounts for 69.7% of total petroleum use (13.3 million barrels per day, 58% gasoline and 21% diesel). • The demand in North America expected to increase from 700 mtoe in 2005 to around 800 mtoe in 2050 • Light trucks account for 31% of energy use, followed by cars & motorcycles at 28%, other	• High impact from energy efficiency and energy saving programs • Global demand for energy is also lower because of lower growth and changes in lifestyle. • Increase in energy consumption, but will be lower than Freeway scenario. • Energy monitoring technology will become popular

	trucks 16%, aircraft 9%, boats & ships 5%, trains & buses 3%, military 3%, pipelines 2%, and lubricants 1%.	
Transport Intermodal	• Individual transport solutions • Solutions are more short term and lack wide perspectives • US has largest freight transportation system worldwide. • US freight exports doubled from US$ 682 bn to US$ 1.3 trillion from 1998-2008. • However, since 2001 US share of world GDP and merchandise has declined. • Intermodal rail traffic in the US has significantly increased over past 2 decades.	• Stronger emphasis on public transport • Solutions are long term with a wide perspectives
Air Traffic/Freight	• High growth of air traffic and freight sector • • 45% of goods by value are handled by water in the US, 25% by air, and 24% by land (truck, rail, pipeline). • 2008 US receipts for freight transportation were $22 billion, double 1998 figures. Payment for freight services were $45 billion. • Over the next 20 years, Boeing expects passenger travel to increase by 3.4% a year and freight by 5% a year.	• Less growth due to lower economic growth
ICEs	• High efficiency ICEs • Remain dominant • ICE and e-transport technologies grow side by side – latter is heavily dependent on market demand • Remain the dominant transport technology in the region. US government has mandated higher energy efficiency figures. US Fuel economy figures stand at 22.5 mpg for cars and 18 mpg for Light trucks). • In 2005, LDV stock was at 211 million in US, 17 millions in Canada and 15 millions in Mexico. • In 2005, sales were 14.7 million in US, 1.3 millions in Canada, and 1.3 in Mexico. • In 2005, 473,000 used cars went from US to Mexico and 186,000 from US to Canada. Within the US, there was 665,000 used cars sold. • Sales of both new and old cars, in addition to the existing stock are all dominated by ICEs	• High efficiency ICEs
Hybrids	• More hybrids • Remain popular, although market share remains stagnant • US Federal government acquisition of hybrids is growing yearly but still at a very low level (4853 vehicles in 2010). • Demand and market share for hybrids are rising but still low (290,000 units sold in 2010, total hybrid fleet is reaching 2 million (around 1-2% of the total stock), mostly Toyota Prius followed by Honda Civic). • IEA forecasts that there will be about 15-20 million Hybrids by 2020 and about 80 million by 2040.	• moderate hybrids share growth • Market share of hybrids will remain high (if EVs underperform)
EVs	• Batteries still expensive. • With time, R&D will drive battery prices down • competitive market facilitate new business models for battery replacement • Oil still a necessity for most transport demand, even in 2050. • Innovation centres in the Eastern markets and mega-cities drive the introduction of large numbers of EVs due to air quality concerns in mega cities. In the longer term, low cost EVs penetrate western markets. • Small market share – personal, intra-city transport only •	• Earlier penetration of EVs and more use of electricity in public transport fleets (government directed). • Efficiency of electric vehicles transforms energy demand and landscape. However, impact really visible after 2025. By 2050, EV expected to be 40% of the LDVs demand share (extreme case as in IEA's 450 level). This is subject to significant improvement to the grid systems. • Fossil fuels reduced to cover 30% of LDVs transport energy demand in 2050. Remaining 30% is provided by Biofuels and FCs. • Lower OECD transport emission (assuming CCS for power generation) in the long run. • Main emerging economies avoid mistakes of

	• EV adoption is expected in urban areas, where distance travelled is within the vehicle range. US is expected to be second largest EV market after Asia.	developed world, leapfrogging technologies.
CNGs	• More CNGs if gas reserves available as E&P accessible by IOCs • Increasingly popular due to low fuel cost – increasing share in heavy road transport • Move towards developing GNG engines for High DVs and Medium DVs. • Still at low levels and potential.	• CNGs significantly in transport early on by local governments with access to domestic gas reserves.
FCs	• FCs small breakthrough as they are still expensive • Dependent on technological breakthrough • Small scale test projects • In development stages. IEA estimates likelihood of FCVs emerging as future low carbon option is less than switch to EV.	• Fuel cells adopted to reduce dependency on foreign oil
Biofuels	• Food crisis depresses global biofuels growth • Strong regional hubs in both North and South America • Gene technology used to grow energy crops (except EU). 2nd & 3rd generations are still expensive • Unlikely to grow without government subsidies. • In 2009, the US production of biofuels was about 45% of the global (mostly bioethanol from maize). Production was about 0.585 million b/d bioethanol and about 44,000 b/d biodiesel. • IEA expects US to account for 38% of global biofuels market in 2035. Avg. annual growth is expected to be 5%. • US targets 136 billion litres of biofuels by 2022 (1.162 million barrel per day). Current legislation allows for E10 blending, farmers lobby is keen on increasing it to E15. • US biofuels consumption in 2009 was 0.7 million b/d, world's highest, ahead of Brazil which consumed 0.31 million b/d. • IEA estimates 2009 biofuels support to be US $8.1 billion.	• Increasing contribution of first generation biofuels to fuel mix • Larger impact on food prices • Gene modifications of crops still not accepted in EU. • Large contribution of second (and 3rd ?) generation biofuels in the long term • Continues to grow under government subsidies & fuel blending regulations.
Urban Planning	• Good economies will invite better planning and problem solving. • Congestion in cities will drive private solutions to intra-city transport, e.g. rise in car sharing, innovating car ownership schemes, etc. • Second highest urban land area worldwide after Asia. • Second lowest urban population density after Oceania. • Has a high urbanization rate. About 82% of US population lives in urban areas, Mexico is about 77% and Canada about 81%. • North American cities are more spread out and consequently urban consumption of fuel is the highest in the world. Around 80% of urban transport is via individual motorized transport. Automobile usage is more than 10,000km/person/year	• Governments alone can poorly direct/coordinate urbanisation. • Problems worsen with tight government budgets and bad economies. • Local governments will pass regulations limiting number of cars and increasing certain modes of intra-city transport.
High Speed rails	• There could be problems with corridors and private sector funding. • Private sector investment available, however, dependent on resolution of political uncertainty. • Scale reached will be more than in Tollway scenario. • Current US administration seeks to provide high speed rail access to 80% of Americans within next 25 years. $10 billion grant funding available. So far, 59 projects have been allocated 6 billion. • Currently, US has 362 km of HSR, with 900 km being planned.	• Penetration of high speed rail networks at a larger scale, especially in second half of scenario period • Funding for nation-wide plan may be a problem as it comes with increased govt. regulation.

Vehicles Ownerships	• More vehicles ownerships • In 2005, the vehicle ownership stood at 710 vehicles/1000 population for US (Avg. annual growth rate: 1.6%), 535 for Canada (Avg. annual growth rate: 1.6%) and 142 for Mexico (Avg. annual growth rate: 2.8%). (Source: Dargay, 2007).	• Less car ownerships & more reliance on public transport systems, car sharing and rentals.
Aviation, Shipping, Rails & Trucks	• High growth for both passenger travels and freight especially in eastern markets. • Demand in North America is for diesel locomotives (approx.. 1000 locos sold per year), since the rail system is used for heavy haulage and is mostly single track with few crossing points and intersections. • North America has the largest aircraft fleet size – 6,590 (2009). 7,200 new aircraft are due to be supplied to region, and by 2029, the region is expected to have 9,000 aircraft (around 25% of global fleet in 2029). • US has highest trucking haulage rates globally. Avg. fuel efficiency per truck is 20-25 km/litre. • US is ranked 6th in controlled fleet by deadweight tonnage with 1,865 vessels. IMO expects shipping activities to increase by 150-300% from 2007-2050.	• More moderate growth levels.

5- LAC

Issue	1-Freeway	2-Tollway
General	• World with solutions where pure market forces prevail	• Regulated world where governments and politicians decide to put common interests at forefront and intervene in markets
Players	• Private sector leads • Global companies emerging as central players • Entrepreneurs • Consumers	• Public sector leads • Local Governments acting as central planners • NGOs • Citizens
Trade	• WTO makes progress competitive issues??? • Free and expanding international trade in regard to trade & barriers removals. • Globalized economy • Global competition and occasional trade disputes • High global trade imbalances • Trade with US increases • Chinese investment in LAC increases • Joint ventures between Brazil, Argentina, Chile, and developing Asian countries increases • Regional trade groups become powerful	• WTO shows increased emphasis on free flow of green goods and services • Increased international cooperation on climate change issues in the short to medium term. • Individual countries/regions preferring local content and solutions • More fragmented and /differentiated global economy • More trade restrictions due to regional concerns
International Institutions	• Less prominent international institutions •	• Stronger role for international and multilateral institutions
FDI	• Increased level of FDI • US and China lead investors • IOCs invest in Brazil's offshore oil deposits • Mining firms continue to invest in minerals exploration • Funding from international institutions increases in line with FDI – they do not influence regional politics	• Same or less • Increased national investments • Funding levels from international institutions are more than Freeway scenario – institutions influence regional politics
Technologies	• Technological innovation market driven • Emerging innovation centres attracting and competing for investment capital and human resources • Original Equipment Manufacturers (OEM) develop transport solutions most wanted by consumers • MNCs transfer technology to domestic firms in order to lower costs of production	• Governments picking technology winners (e.g. photovoltaic) • Higher amount of technology transfer into developing nations • Multinational technology co-operation and initiatives • More state subsidies sponsor focused research programs into new transport technologies
Capital & Labour	• Free flow of capital & labour	• Restricted flow of capital & labour
Manufacturing centres	• Manufacturing established in low cost centres & close to major markets • Flow of foreign goods (esp. Chinese) increases	• Manufacturing established in less optimal locations but with regional development and factors in mind

	in domestic markets. • Improvements in domestic manufacturing centres – effect of competition.	• Brazil and Argentina emerge as regional manufacturing centres
Infrastructure	• Patch work of improvements in many regions • Large-scale investments made in infrastructure in natural resource rich areas – roads, ports, heavy industry, electricity & water supply	• New infrastructure projects, mainly in renewable energy and public transport, state funded • Access to energy and public transport schemes in poorer parts of LA are being promoted by international institutions (UNIDO) • Government undertakes most of the investment, which is localised (upgrade urban infrastructure, rural energy access) – scale of development is not comparable to Freeway scenario. • Regional spend of infrastructure is around 2% of GDP per year. Will need to spend about 4-6% per year to sustain growth. • Brazil and Chile have invested heavily in developing their fossil and mineral resources. • Main infrastructure spender in the region is governments.
Climate change	• Commercially viable Innovative Green technologies/practices flourish • Not a priority unless part of official government policy	• Big focus and international efforts on climate change by governments in short, medium to long terms. • Energy access and rural development more of a priority. • Climate change policies implemented only by LAC governments only if there is international and regional consensus • Brazil takes a leading role in Biofuels and continues to increase development of agricultural areas, despite ecological concerns about adverse impacts • Secondary to energy access and rural development issues.
Politics & competition for resources	• Pure competition creates cost-efficient solutions • Higher demand creates global competition for resources • Fossil-fuel and mineral resources are fully exploited • Attempts by regional trade bodies to enforce regulations on foreign trade in order to capture higher returns	• Less competition over energy resources • Focus on regional supply and energy efficiency reduce competition for resources • Governments regulate foreign activity in resource sector • Region has undergone political turmoil in the past. • Brazil has undergone a presidency change and is stable. • Venezuela continues to face uncertainty under Chavez, although his health is failing. • Overall political stability in the region ranges is medium to volatile.
Regulation	• Low government regulation (minimum regulated environment)	• High government regulation (fully regulated environment) • Most energy companies are government owned and run, or at least the government is the majority shareholder.
Competitive	• Pure market forces • Market seeks competitive cost solutions • Favourable climate for open global competition	• Same or less market influence • Market distortions through government intervention
Privatization, liberalization, deregulation	• Wave of privatization, liberalization & deregulation	• Same level or less • Energy and transport sector considered strategic in most countries • Energy (upstream) and utilities are still part of public sector • Region began to liberalize its trade practices between 1980 and 1990. • Active trading within the region; ALADI, CARICOM, Mercosur, etc.
Economic Volatility	• High economic volatility • Potential super-cycles • Argentina experienced recession from 1999-2002, economy still recovering, therefore more susceptible to economic shocks. • Brazil – robust economy, embarked on growth trajectory, more resistant to economic volatility. • Region will weather short term economic fluctuations, but will be affected by longer,	• More stable economic environment at lower growth levels in the short term. • True growth potential of LAC economies are not reached due to non-liberal policies. This may shield countries from economic contagion.

	harsher dips.	
Wealth	• High & increasing wealth in western world & successful new industrial (SE Asia & LAC). • Africa still marginalized. • Investment in core industries reduces unemployment and raises wages. • Social divide increases and leads to political volatility and unrest	• Wealth disparity is less obvious in industrial countries • Some poorer LAC countries improving due to technology transfer (e.g. Copenhagen accord) and multi-lateral programs (e.g. UNIDO access to energy program). • GDP per capita for LAC is about $7260 (about $8230 for Brazil)
R&D	• Diverse R&D efforts • Driven by both private and public sectors • R&D investment correspondent with level of education and literacy - impact will be felt in latter half of scenario.	• More focused R&D programmes driven mainly by public sector • International research programs and technology "clearing houses" to facilitate technology transfer. • State & state enterprises sponsored R&D programmes increase. • Low. • Dependent on technology transfer. • Brazil starts to take a role on par with Western companies in the Biofuels sector where a large number of international co-operation agreements are signed
Carbon pricing	• Efficient carbon price mechanisms • Carbon price market in LAC dependent on growth and status of global carbon market. • Regional market for carbon possible only with government support.	• Existing Clean Development Mechanisms (CDMs) may fail in EU-US and not take off in other markets • Regional limits and penalties imposed by local governments. • Set of regional agreements on climate change and introduction of carbon price mechanisms. • International incentives for countries to join, through investment funding and technology transfer system. • Regional government align with international consensus on carbon markets. State-funded mechanisms are put in place to encourage carbon trading.
Sustainability	• Cheaper but less wide-spread solutions	• More expensive sustainability (as efficient prices are not driving players actions) but faster implementation
Consumer behaviour & lifestyle	• Consumer spending increases, savings drop • Individual interests dominate • Cheapest price and highest comfort dominate and differentiate products • Demand for consumer goods, telecom, and IT services will increase, related energy consumption will rise.	• Consumer spending decreases, saving increases • Common interests at forefront • Consumer power used to stimulate development of greener goods and services • Social activism increases and forces producers and governments to put common interests at forefront • Best public image and corporate responsibility differentiate in addition to price • Region's average individual consumption per capita is above world average. • Range: Mexico is three times world average while Bolivia is less than 50% of world avg. • Chile, Mexico, Argentina, Uruguay have consumption levels above world average.
Good Economic Situation-Top of Business cycle	• High but uneven distributed economic growth. • Sufficient fund for new private investments. •	• Sufficient economic performance to fund government initiatives in energy. • Overall economic growth is more moderate. Still distributed unevenly across regions. • IMF expects growth in the region to be 4.75% in 2011 and 4.25% in 2012. • Thru 2035, the GDP growth for LAC is about 3% a year (about 3.3% for Brazil) • Growth will be commodity based and driven to be demand from China.
Bad Economic Situation-Bottom of Business cycle	• Low & uneven distributed economic growth. • Wide spread austerity packages reducing new investments and energy demand. •	• Still sufficient economic performance in developing countries (shielded such as China & Brazil). Much weaker in developed. Still distributed unevenly. • Large public sector debt developing. • Effect of down-cycle partially mitigated by lower energy demand and import bills due to energy efficiency gains.
Population	•	• In 2008, the LAC population stood at 468 million

		(42% in Brazil, 194 millions). The growth was about 1.1% a year (0.9% for Brazil). • About 28% of the total population is under 14 years (26% in Brazil). • Population growth rates of countries in the region have been decreasing. • Thru 2035, LAC is expected to grow by 0.8% a year (Brazil at 0.5%)
Finance	• Private Financing capital available, abundant and easy to flow	• More Limited private financing capital mostly by local institutions • Large public sector and international funding for infrastructure and "green" projects • Funding is quite limited. • Funding for infrastructure projects from international organisations like World Bank, IFC, etc. • Extensive Chinese funding for infrastructure projects in energy & commodities, around US$ 4bn/year.
Corruption	• Could lessens in many regions • Corruption remains high in first half, but falls in second half.	• Tops list in South Asia, Sub-Saharan Africa, transition economies. • Continues to remain high. • High level of corruption according to latest Transparency International survey •
Bureaucracy	• Lessens in many regions • Remains high till latter half, but does not impediment private sector investment.	• Remains an issue everywhere. • Remains high. • High level of bureaucracy
Tax regulation	• Taxes (as a market distortion) drops in many regions	• Constitutes a severe constraint on OECD and post socialist transition economies. • New taxes needed to finance large public sector debt in Western economies • About average (much less than OECD)
Subsidies	• Subsidies (as another market distortion) removed in many regions. Remaining subsidies mainly in renewables. •	• Subsidies remain and increase for green goods and services. • Biofuels continue to be subsidised. • Venezuela has world's 7th highest fossil fuel consumption subsidy (mostly for oil). Total subsidy as share of GDP is less than5%. Oil subsides are around 12 billion dollars (2009). • Mexico also has fuel subsidies, but very low in comparison.
Energy E&P	• Many countries open their upstream sectors resulting in a surge of supply. • Moderate oil prices in the short term. • More security of supply and demand • Fossil fuel dominance reducing only gradually • High growth of energy demand, leading to higher prices at the end of scenario period. • Industrial demand for energy reaches all-time peak • Electricity prices increasing sharply, leading to energy poverty • Sub-salt oil deposits become one of the core drivers of growth in Brazilian economy. • Bolivian gas deposits are optimally exploited.	• Lack of opening new areas for E&P leading to tight supplies • High infrastructure costs for early integration of renewable energy sources • higher oil and energy prices at the beginning of scenario period, but lower, more stable prices after quicker transition to renewable energy sources • Oil price is tightly regulated • Security of supply and climate change concerns push drive to reduce dependence from fossil fuels • Clean coal and CCS socially unacceptable in EU and US but becomes a must for developing world • Electricity prices increasing sharply, leading to energy poverty and government subsidies for lower incomes • Sub-salt reserves are not fully exploited. • Some LAC countries continue to be dependent on oil imports. • Brazil has embarked on developing its sub-salt oil reserves • The ultra-deep water drilling has changed the oil picture • Development of Venezuela's reserves has slowed during the Chavez regime. • Region also has significant reserves of conventional gas in Venezuela, Bolivia, Argentina, Mexico, Trinidad & Tobago.
Liberalization, policy	• Liberalized energy markets and high	• Limited competition and participation

agreements	competition for resources on a global basis • Easy to reach international agreements on removing trade barriers • No agreements on international energy policy due to competing interests. • Energy market lacks of ability to reach international agreements and common set of basic rules • Markets are liberalized. • Move towards creation of a common LAC market. • Liberal policies allow inflow of FDI and setting up of industry • Underperforming state energy companies are either privatised or made minority partners in ventures with international firms.	• Policy agreements of "coalitions of the willing" to reduce greenhouse gas emissions and setting of (increasingly) international standards for carbon pricing • Stronger role for international institutions to set policies • Move towards liberalisation is much slower.
Policy initiatives	• Policy initiatives aimed at setting framework conditions for market solutions to emerge	• Energy policy initiatives set by centralized government where regulations of energy sector reverts to national states • Protectionism continues.
International cooperation	• Successful international coordination on free market mechanisms • International agreement on clean energy mechanisms may not occur due to imposition of higher costs of production.	• International coordination of energy taxes progressing
Energy Saving	• Significant saving (higher prices/efficient markets)	• Large government focus on energy efficiency and energy saving programs • Efficiency brands (Like Energy Star) become dominant in consumer minds
Energy Consumption	• High economic growth yields high energy consumption	• High impact from energy efficiency and energy saving programs • Global demand for energy is also lower because of lower growth and changes in lifestyle. • LAC is heavily dependent on conventional gasoline/diesel/jet fuel. • LAC is expected to be dependent on conventional gasoline/diesel/jet fuel thru 2050. • Thru 2050, LAC consumption is expected to double from 150 mtoes in 2005 to around 300 mtoe in 2050. • In 2008, LAC consumed about 47 mtoe (about 939,000 b/d) gasoline and 62 mtoe (about 1.236 million b/d) diesels.
Transport Intermodal	• Individual transport solutions • Solutions are more short term and lack wide perspectives	• Stronger emphasis on public transport • Solutions are long term with a wide perspectives • LAC is considered a leader in bus Rapid Transit systems (with the first system in Curitiba) • Other examples now include Bogota, Sao Paulo, Guayaquil, etc. • Boeing projects number of aircraft in the region in 2029 to be 2,770, up from 1,130. • Thru 2029, Boeing also expects air cargo traffic to increase by 6.9% a year and the passenger to increase by 6.7% a year.
Air Traffic/Freight	• High growth of air traffic and freight sector	• Less growth due to lower economic growth
ICEs	• High efficiency ICEs •	• High efficiency ICEs • Predominant mode of transport. • Engines in Brazil are FFVs (flex fuel vehicles). • FFVs in Brazil account for 40% of car fleet. This is incentivized by the government policies towards biofuels.
Hybrids	• More hybrids • Share of hybrids increases if government passes clean air regulation.	• moderate hybrids share growth • Minimum level and potential
EVs	• Batteries still expensive. • With time, R&D will drive battery prices down • competitive market facilitate new business models for battery replacement • Oil still a necessity for most transport demand, even in 2050. • Innovation centres in the Eastern markets and mega-cities drive the introduction of large	• Earlier penetration of EVs and more use of electricity in public transport fleets (government directed). • Efficiency of electric vehicles transforms energy demand and landscape. However, impact really visible after 2025. By 2050, EV expected to be 40% of the LDVs demand share (extreme case as in IEA's 450 level). This is subject to significant

	numbers of EVs due to air quality concerns in mega cities. In the longer term, low cost EVs penetrate western markets. •	improvement to the grid systems. • Fossil fuels reduced to cover 30% of LDVs transport energy demand in 2050. Remaining 30% is provided by Biofuels and FCs. • Lower OECD transport emission (assuming CCS for power generation) in the long run. • Main emerging economies avoid mistakes of developed world, leapfrogging technologies. • • Minimum level and potential •
CNGs	• More CNGs if gas reserves available as E&P accessible by IOCs	• CNGs significantly in transport early on by local governments with access to domestic gas reserves. • Minimum level and potential
FCs	• FCs small breakthrough as they are still expensive	• Fuel cells adopted to reduce dependency on foreign oil • FC technology adoption only if local R&D succeeds and roll-out is economically viable on a small scale. • Minimum level and potential
Biofuels	• Food crisis depresses global biofuels growth • Strong regional hubs in both North and South America • Gene technology used to grow energy crops (except EU). • 2nd & 3rd generations are still expensive • Continue to enjoy high growth – increasing encroachment on sugar sector	• Increasing contribution of first generation biofuels to fuel mix • Larger impact on food prices • Gene modifications of crops still not accepted in EU. • Large contribution of second (and 3rd ?) generation biofuels in the long term • • Brazil is the second biofuel producer (after the US) with a production level of 27% of the global, mostly bioethanol from sugar cane (0.467 million b/d) and around 19,000 b/d biodiesel. • Consumption of biofuels in the region in 2009 was 0.35 mb/d. Brazil consumption alone accounted for 0.31 mb/d in 2009. The balance was exported (mainly to EU and US). • Current blend rate is 25% (flexible when pressure is placed on sugar market)
Urban Planning	• Good economies will invite better planning and problem solving. • Existing megacities will continue to experience high growth. • Transformation of medium-size cities into large cities.	• Governments alone can poorly direct/coordinate urbanisation • Problems worsen with tight government budgets and bad economies. • Megacities will grow more congested, no increase in number of large cities. • High level of urbanization. 78% for LAC and 86% for Brazil. • Region has 3 megacities in the top 25 megacities worldwide – Sao Paulo, Buenos Aires, and Rio de Janeiro. Of these, Rio is the fastest growing at 0.66% per year. • Region has 13.7% of world urban population.
High Speed rails	• There could be problems with corridors and private sector funding.	• Penetration of high speed rail networks at a larger scale, especially in second half of scenario period • Operational inter-city HSR in Brazil by first half of scenario. • Not yet under consideration. • Currently, railways are undergoing privatization.
Vehicles Ownerships	• More vehicles ownerships	• Less car ownerships & more reliance on public transport systems, car sharing and rentals. • The average ownership rate is about 78 cars/1000 capita. • Mexico: 165 vehicles/1000 population. Avg. annual growth rate: 4.9% • Argentina: 186 vehicles/1000 pop. Avg. AGR: 3.1% • Brazil: 121 vehicles/1000 pop. Avg. AGR: 4.6% • Chile: 144 vehicles/1000 pop. Avg. AGR: 5.4%
Aviation, Shipping, Rails & Trucks	• High growth for both passenger travels and freight especially in eastern markets. • High growth for trucks sector.	• More moderate growth levels. • Main mode of transport is road. • Mostly medium trucks perform the haulage.

Appendix B: Model's Input Assumptions (Exogenous Parameters)

1-General

Base year: 2005

Time horizon: 2050

Time step: 5 year

Technology (Cars) life time: 15 years

Discount rate: 5%

Annual GDP growth rate (%)

Freeway	2010	2015	2020	2025	2030	2035	2040	2045
	-2015	-2020	-2025	-2030	-2035	-2040	-2045	-2050
Africa	4.1%	5.1%	5.9%	6.8%	7.6%	7.7%	7.5%	6.6%
Asia (exl. China, India)	7.3%	6.2%	5.5%	4.6%	4.1%	3.4%	3.1%	2.7%
Brazil	3.1%	4.2%	5.5%	5.8%	5.7%	5.0%	4.4%	3.6%
Canada	2.1%	1.8%	1.8%	1.6%	1.8%	1.6%	1.5%	1.4%
China	8.9%	7.4%	6.5%	5.1%	4.1%	3.4%	3.2%	2.6%
Non-OECD Europe	2.9%	2.9%	3.0%	3.2%	3.6%	3.6%	3.4%	3.2%
OECD Europe	2.1%	1.9%	1.8%	1.5%	1.5%	1.3%	1.2%	1.1%
FSU (exl. Russia)	5.9%	5.8%	5.6%	5.4%	5.4%	5.1%	4.7%	4.1%
India	6.5%	6.9%	7.3%	7.2%	7.1%	6.4%	5.9%	4.9%
LAM (exl. Brazil, Mexico)	5.3%	5.0%	4.8%	4.5%	4.5%	4.1%	3.9%	3.4%
MEA	2.9%	3.2%	3.9%	4.5%	5.0%	5.1%	5.0%	4.4%
Mexico	4.1%	4.6%	5.4%	5.3%	5.1%	4.5%	4.1%	3.5%
OECD Pacific+Asia	1.4%	1.1%	1.1%	0.9%	0.8%	0.7%	0.7%	0.7%
Russia	4.4%	4.7%	4.9%	5.1%	5.3%	4.9%	4.3%	3.7%
USA	1.8%	1.4%	1.3%	1.2%	1.6%	1.5%	1.5%	1.3%
World avg.	*3.2%*	*3.1%*	*3.2%*	*3.1%*	*3.2%*	*3.0%*	*3.0%*	*2.7%*

Tollway	2010	2015	2020	2025	2030	2035	2040	2045
	-2015	-2020	-2025	-2030	-2035	-2040	-2045	-2050
Africa	3.9%	4.8%	5.5%	6.4%	7.1%	7.2%	7.0%	6.3%
Asia (exl. China, India)	6.4%	5.5%	4.9%	4.1%	3.6%	3.1%	2.8%	2.4%
Brazil	2.8%	3.7%	4.7%	5.0%	4.8%	4.3%	3.7%	3.0%
Canada	1.9%	1.6%	1.6%	1.5%	1.6%	1.4%	1.3%	1.3%
China	7.5%	6.2%	5.4%	4.2%	3.4%	2.9%	2.8%	2.3%
Non-OECD Europe	2.2%	2.2%	2.2%	2.4%	2.7%	2.6%	2.5%	2.3%
OECD Europe	1.8%	1.6%	1.5%	1.3%	1.2%	1.1%	1.0%	0.9%
FSU (exl. Russia)	4.6%	4.6%	4.4%	4.2%	4.2%	3.9%	3.7%	3.2%
India	5.7%	6.0%	6.4%	6.3%	6.2%	5.6%	5.1%	4.3%
LAM (exl. Brazil, Mexico)	4.7%	4.5%	4.3%	4.1%	4.0%	3.7%	3.5%	3.0%
MEA	2.8%	3.1%	3.7%	4.2%	4.6%	4.7%	4.7%	4.1%
Mexico	3.7%	4.1%	4.8%	4.7%	4.5%	3.9%	3.5%	2.9%
OECD Pacific+Asia	1.2%	1.0%	0.9%	0.7%	0.7%	0.6%	0.6%	0.5%
Russia	3.3%	3.6%	3.7%	3.8%	4.0%	3.7%	3.2%	2.8%
USA	1.7%	1.3%	1.3%	1.2%	1.4%	1.4%	1.3%	1.2%
World avg.	*2.8%*	*2.7%*	*2.7%*	*2.6%*	*2.7%*	*2.6%*	*2.5%*	*2.3%*

Population (million)

Freeway	2010	2015	2020	2025	2030	2035	2040	2045	2050
Africa	1022	1139	1257	1373	1484	1591	1691	1785	1869
Asia (exl. China, India)	1201	1273	1337	1393	1438	1474	1502	1522	1536
Brazil	195	203	209	214	218	220	220	220	218
Canada	34	36	37	39	40	41	42	43	44
China	1349	1376	1393	1400	1397	1384	1357	1319	1269
Non-OECD Europe	60	59	58	58	56	55	54	53	51
OECD Europe	546	557	567	574	579	583	584	585	584
FSU (exl. Russia)	139	142	145	147	148	148	149	150	150
India	1225	1304	1374	1435	1485	1527	1558	1582	1597
LAM (exl. Brazil, Mexico)	282	298	313	326	338	347	354	359	363
MEA	216	236	256	273	288	302	314	324	333
Mexico	113	120	125	129	133	135	137	138	139
OECD Pacific+Asia	201	204	205	205	204	202	199	196	193
Russia	143	142	141	139	136	134	131	129	126
USA	310	324	337	350	362	373	384	394	403

World Total	*7036*	*7413*	*7754*	*8052*	*8305*	*8513*	*8676*	*8796*	*8873*

Tollway	2010	2015	2020	2025	2030	2035	2040	2045	2050
Africa	1022	1145	1278	1417	1562	1713	1870	2030	2192
Asia (exl. China, India)	1201	1277	1349	1414	1472	1522	1563	1596	1619
Brazil	195	203	210	216	221	223	224	224	223
Canada	34	36	38	39	41	42	43	44	45
China	1349	1378	1396	1404	1402	1391	1371	1342	1306
Non-OECD Europe	60	59	59	58	58	57	56	55	53
OECD Europe	546	560	572	583	591	597	602	605	607
FSU (exl. Russia)	139	143	146	149	151	152	154	155	156
India	1225	1308	1387	1459	1524	1580	1627	1665	1692
LAM (exl. Brazil, Mexico)	282	299	316	332	346	358	369	378	384
MEA	216	237	259	280	299	318	337	354	370
Mexico	113	120	126	131	135	139	142	143	144
OECD Pacific+Asia	201	205	207	208	208	207	205	203	201
Russia	143	143	142	141	139	137	135	133	131
USA	310	326	341	355	369	382	395	407	419
Total	*7036*	*7439*	*7826*	*8186*	*8516*	*8818*	*9091*	*9333*	*9542*

2-LDV Sector

Motorization rate (car/1000 capita)

Freeway

	2010	2015	2020	2025	2030	2035	2040	2045	2050
Africa	23	28	33	37	40	44	49	58	70
Asia (exl. China, India)	27	34	42	51	65	87	115	143	161
Brazil	125	151	166	187	221	266	322	361	378
Canada	575	603	629	653	675	704	733	763	793
China	15	24	35	51	74	101	136	174	193
Non-OECD Europe	201	228	263	292	328	365	402	439	475
OECD Europe	455	493	502	506	506	508	510	514	517
FSU (exl. Russia)	120	144	176	220	276	323	370	415	457
India	8	11	15	19	25	34	48	68	87
LAM (exl. Brazil, Mexico)	65	79	96	112	127	148	177	215	263
MEA	85	98	114	127	142	156	170	185	203
Mexico	173	206	228	264	312	375	452	518	552
OECD Pacific+Asia	430	463	483	495	501	515	530	550	572
Russia	222	263	316	372	440	507	574	641	712
USA	738	763	785	806	823	849	875	901	928
World avg.	*115*	*126*	*135*	*145*	*157*	*174*	*194*	*217*	*235*

Tollway	2010	2015	2020	2025	2030	2035	2040	2045	2050
Africa	23	27	32	36	38	41	44	49	55
Asia (exl. China, India)	27	32	39	44	52	62	75	92	113
Brazil	125	147	159	173	196	224	257	296	329
Canada	575	591	606	623	636	653	670	686	701
China	15	21	29	38	49	64	81	102	127
Non-OECD Europe	201	217	236	257	276	301	323	344	365
OECD Europe	455	477	489	493	496	496	496	497	498
FSU (exl. Russia)	120	134	151	173	200	233	261	287	310
India	8	11	14	17	21	26	33	42	55
LAM (exl. Brazil, Mexico)	65	76	89	105	113	126	143	164	188
MEA	85	96	110	121	134	146	157	168	179
Mexico	173	201	215	241	272	311	357	411	458
OECD Pacific+Asia	430	449	464	475	481	486	492	500	510
Russia	222	246	276	310	347	390	427	461	493
USA	738	753	764	777	789	807	824	838	852
World avg.	*115*	*122*	*128*	*134*	*141*	*149*	*159*	*171*	*185*

Share of LDV types (million in base year 2005)

Freeway & Tollway	Africa	Asia	Brazil	Canada	China	EEUR	FSU	India	LAM	MEA	Mexico	Pacific	Russia	USA	WEUR
Electric Vehicle	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hydrogen Fuel Cell	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hydrogen Hybrid	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gas Fuel Hybrid	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gas Fuel ICEV	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0
Liquid Fuel Plug-in	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Diesel Type Hybrid	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gasoline Type Hybrid	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Diesel Type ICEV	2	0	1	0	3	0	1	2	0	1	0	10	0	1	62
Gasoline Type ICEV	16	25	18	18	12	10	13	6	13	14	15	69	25	221	161
Total	18	25	20	19	14	11	14	7	15	15	15	79	25	222	223

LDV mileage (1000 v-km/y/car)

Freeway & Tollway	2010	2015	2020	2025	2030	2035	2040	2045	2050
Africa	12	12	12	12	12	12	12	12	12
Asia (exl. China, India)	16	16	16	16	16	16	16	16	16
Brazil	16	16	16	16	16	16	16	16	16
Canada	17	17	17	17	17	17	17	17	17
China	15	15	15	15	15	15	15	15	15
Non-OECD Europe	12	12	12	12	12	12	12	12	12
OECD Europe	12	12	12	12	12	12	12	12	12
FSU (exl. Russia)	13	13	13	13	13	13	13	13	13
India	15	15	15	15	15	15	15	15	15
LAM (exl. Brazil, Mexico)	16	16	16	16	16	16	16	16	16
MEA	18	18	18	18	18	18	18	18	18
Mexico	11	11	11	11	11	11	11	11	11
OECD Pacific+Asia	12	12	12	12	12	12	12	12	12
Russia	13	13	13	13	13	13	13	13	13
USA	19	19	19	19	19	19	19	19	19

LDV transport demand (Billion v-km)

Freeway	2010	2015	2020	2025	2030	2035	2040	2045	2050
Africa	288	381	498	617	719	838	999	1244	1574
Asia (exl. China, India)	512	684	896	1147	1506	2045	2768	3492	3945
Brazil	390	490	555	642	770	935	1136	1270	1319
Canada	332	365	398	429	457	490	522	555	588
China	310	488	730	1061	1542	2105	2759	3433	3680
Non-OECD Europe	144	162	184	201	222	242	260	277	291
OECD Europe	2982	3296	3414	3486	3516	3552	3575	3603	3623
FSU (exl. Russia)	218	266	331	420	529	623	716	806	888
India	153	224	315	417	560	774	1117	1615	2089
LAM (exl. Brazil, Mexico)	293	376	483	583	683	821	1001	1237	1525
MEA	330	417	524	623	734	845	958	1079	1214
Mexico	215	272	313	375	455	559	681	786	840
OECD Pacific+Asia	1038	1131	1187	1215	1225	1245	1266	1294	1321
Russia	412	486	579	673	780	881	980	1074	1168
USA	4354	4694	5028	5355	5656	6018	6373	6739	7108
Total	11972	13732	15436	17246	19353	21973	25110	28503	**31175**

Tollway	2010	2015	2020	2025	2030	2035	2040	2045	2050
Africa	288	373	484	612	720	842	991	1190	1452
Asia (exl. China, India)	512	650	833	1001	1227	1517	1882	2350	2921
Brazil	390	478	534	598	690	801	923	1063	1173
Canada	332	360	387	415	440	466	491	516	541
China	310	438	613	797	1037	1332	1668	2057	2494
Non-OECD Europe	144	155	167	180	191	205	216	225	233
OECD Europe	2982	3209	3356	3449	3514	3553	3584	3613	3632
FSU (exl. Russia)	218	249	287	334	392	460	522	579	628
India	153	211	292	371	475	614	798	1051	1387
LAM (exl. Brazil, Mexico)	293	362	449	555	623	725	844	990	1156
MEA	330	409	514	610	722	836	952	1072	1191
Mexico	215	265	299	348	405	476	555	648	724
OECD Pacific+Asia	1038	1103	1150	1183	1198	1204	1210	1218	1227
Russia	412	457	511	568	628	695	750	800	841
USA	4354	4656	4941	5244	5530	5863	6182	6490	6788
Total	11972	13376	14818	16263	17793	19589	21568	23862	**26389**

LDV efficiency (MJ/km)

Freeway & Tollway	2010	2015	2020	2025	2030	2035	2040	2045	2050
HEV	1.84	1.65	1.47	1.28	1.1	1.1	1.1	1.1	1.1
Diesel HEV	1.74	1.56	1.38	1.19	1.01	1.01	1.01	1.01	1.01
CNG HEV	1.67	1.52	1.37	1.23	1.08	1.08	1.08	1.08	1.08
H2 HEV	1.77	1.6	1.43	1.26	1.09	1.09	1.09	1.09	1.09
Plugin-HEV (electricity share)	0.39	0.38	0.37	0.37	0.36	0.36	0.36	0.36	0.36
Plugin-HEV (gasoline share)	0.73	0.66	0.58	0.51	0.43	0.43	0.43	0.43	0.43
BEV	0.71	0.68	0.65	0.65	0.65	0.65	0.65	0.65	0.65
HFCV	1	0.97	0.94	0.91	0.88	0.88	0.88	0.88	0.88
Gasoline advanced ICEV	2.27	2.2	2.14	2.07	2.01	2.01	2.01	2.01	2.01
Diesel advanced ICEV	2.11	2.03	1.96	1.83	1.72	1.72	1.72	1.72	1.72

LDV efficiency targets (gCO2/km)

Tollway	2010	2015	2020	2025	2030	2035	2040	2045	2050
AFRICA	-	-	304.4	253.2	239.0	237.9	240.4	238.4	240.9
ASIA	-	263.0	253.0	237.1	213.9	182.9	152.3	128.4	113.1
BRAZIL	-	253.0	237.1	213.9	182.9	152.3	128.4	113.1	106.2
CANADA	-	266.1	222.3	194.4	182.4	160.7	131.8	112.5	102.8
CHINA	-	-	395.3	340.0	285.8	229.6	179.2	146.2	138.5
EEUR	-	253.0	237.1	213.9	182.9	152.3	128.4	113.1	106.2
WEUR	-	168.4	148.3	130.0	116.4	106.7	102.8	102.8	102.8
FSU	-	253.0	237.1	213.9	182.9	152.3	128.4	113.1	106.2
INDIA	-	263.0	253.0	237.1	213.9	182.9	152.3	128.4	113.1
LAM	-	253.0	237.1	213.9	182.9	152.3	128.4	113.1	106.2
MEA	-	263.0	253.0	237.1	213.9	182.9	152.3	128.4	113.1
MEXICO	-	253.0	237.1	213.9	182.9	152.3	128.4	113.1	106.2
PACIFIC	-	207.3	173.4	145.2	130.0	116.4	106.7	102.8	102.8
RUSSIA	-	253.0	237.1	213.9	182.9	152.3	128.4	113.1	106.2
USA	-	309.9	271.0	223.5	188.6	160.7	131.8	112.5	102.8

Freeway	2010	2015	2020	2025	2030	2035	2040	2045	2050
AFRICA	-	-	304.4	253.2	239.0	237.9	240.4	238.4	240.9
ASIA	-	263.0	253.0	237.1	213.9	185.4	161.8	144.3	132.3
BRAZIL	-	253.0	237.1	213.9	185.4	161.8	144.3	132.3	124.3
CANADA	-	266.1	222.3	194.4	184.3	166.6	143.4	128.0	120.3
CHINA	-	-	395.3	340.0	285.8	229.6	179.2	146.2	138.5
EEUR	-	253.0	237.1	213.9	185.4	161.8	144.3	132.3	124.3
WEUR	-	168.4	148.3	131.9	124.1	120.3	120.3	120.3	120.3
FSU	-	253.0	237.1	213.9	185.4	161.8	144.3	132.3	124.3
INDIA	-	263.0	253.0	237.1	213.9	185.4	161.8	144.3	132.3
LAM	-	253.0	237.1	213.9	185.4	161.8	144.3	132.3	124.3
MEA	-	263.0	253.0	237.1	213.9	185.4	161.8	144.3	132.3
MEXICO	-	253.0	237.1	213.9	185.4	161.8	144.3	132.3	124.3
PACIFIC	-	207.3	173.4	145.2	131.9	124.1	120.3	120.3	120.3
RUSSIA	-	253.0	237.1	213.9	185.4	161.8	144.3	132.3	124.3
USA	-	309.9	271.0	223.5	190.5	166.6	143.4	128.0	120.3

Share of short-range cars (% of v-km/y): 10% Flat

LDV size of batteries and FC (kWh and kW per car):

Battery EV = 48kWh,
Plug-in-HEV = 8.2kWh,
FC in HFCV = 40kW,
EB in HFCV = 42kW,
HEV = 28kW.

Fixed O&M cost ($2000/car)

About 2-2.5% of the LDV investments (following)

LDV investment cost ($2000/car/yr), without Battery and Fuel Cell costs

Freeway & Tollway	2010	2015	2020	2025	2030	2035	2040	2045	2050
Gasoline ICEV	17956	17985	18013	18042	18071	18071	18071	18071	18071
Gasoline Adv. ICEV	18100	18275	18450	18625	18800	18800	18800	18800	18800
Gasoline HEV	19800	19800	19800	19800	19800	19800	19800	19800	19800
Diesel ICEV	19856	19885	19913	19942	19971	19971	19971	19971	19971
Diesel Adv. ICEV	20000	20000	20000	20000	20000	20000	20000	20000	20000
Diesel HEV	21000	21000	21000	21000	21000	21000	21000	21000	21000
CNG ICEV	19000	19200	19200	19200	19200	19200	19200	19200	19200
CNG HEV	20100	20100	20100	20100	20100	20100	20100	20100	20100
H2 HEV	21900	21900	21900	21900	21900	21900	21900	21900	21900
Plugin-HEV	20300	20300	20300	20300	20300	20300	20300	20300	20300
BEV	16900	16900	16900	16900	16900	16900	16900	16900	16900
HFCV	18200	18200	18200	18200	18200	18200	18200	18200	18200
Short-range-car Gasoline ICEV	13467	13488	13510	13532	13554	13554	13554	13554	13554
Short-range-car Adv. Gasoline ICEV	13575	13706	13838	13969	14100	14100	14100	14100	14100
Short-range-car HEV	14850	14850	14850	14850	14850	14850	14850	14850	14850
Short-range-car Plug-in HEV	15225	15225	15225	15225	15225	15225	15225	15225	15225
Short-range-car HFCV	12675	12675	12675	12675	12675	12675	12675	12675	12675
Short-range-car BEV	13650	13650	13650	13650	13650	13650	13650	13650	13650

Investment costs for battery and FC ($2000/kW)

Tollway	2010	2015	2020	2025	2030	2035	2040	2045	2050
Battery Storage	288.48	214.42	140.36	121.11	101.86	100.93	100	100	100
Hydrogen Full Cell	250	231.03	212.06	180.04	148.02	126.475	104.93	94.53	84.13

Freeway									
Battery Storage	300	294.24	288.48	274.31	260.14	232.94	205.74	184.525	163.31
Hydrogen Full Cell	250	250	250	250	250	250	250	250	250

Investment cost adjustments (%)

Tollway									
Long-Range BEV	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**	**2050**
AFRICA	0	0	0	0	0	0	0	0	0
ASIA	0	0	0	0	0	0	0	0	0
BRAZIL	0	0	0	0	0	0	0	0	0
CANADA	-0.09	-0.09	-0.09	-0.09	-0.09	-0.09	-0.09	-0.09	-0.09
CHINA	0	0	0	0	0	0	0	0	0
EEUR	-0.09	-0.09	-0.09	-0.09	-0.09	-0.09	-0.09	-0.09	-0.09
WEUR	-0.18	-0.18	-0.18	-0.18	-0.18	-0.18	-0.18	-0.18	-0.18
FSU	0	0	0	0	0	0	0	0	0
INDIA	0	0	0	0	0	0	0	0	0
LAM	0	0	0	0	0	0	0	0	0
MEA	0	0	0	0	0	0	0	0	0
MEXICO	0	0	0	0	0	0	0	0	0
PACIFIC	-0.18	-0.18	-0.18	-0.18	-0.18	-0.18	-0.18	-0.18	-0.18
RUSSIA	0	0	0	0	0	0	0	0	0
USA	-0.135	-0.135	-0.135	-0.135	-0.135	-0.135	-0.135	-0.135	-0.135
Long-Range PHEV	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**	**2050**
AFRICA	0	0	0	0	0	0	0	0	0
ASIA	0	0	0	0	0	0	0	0	0
BRAZIL	0	0	0	0	0	0	0	0	0
CANADA	-0.045	-0.045	-0.045	-0.045	-0.045	-0.045	-0.045	-0.045	-0.045
CHINA	0	0	0	0	0	0	0	0	0
EEUR	-0.045	-0.045	-0.045	-0.045	-0.045	-0.045	-0.045	-0.045	-0.045
WEUR	-0.09	-0.09	-0.09	-0.09	-0.09	-0.09	-0.09	-0.09	-0.09
FSU	0	0	0	0	0	0	0	0	0
INDIA	0	0	0	0	0	0	0	0	0
LAM	0	0	0	0	0	0	0	0	0
MEA	0	0	0	0	0	0	0	0	0
MEXICO	0	0	0	0	0	0	0	0	0
PACIFIC	-0.09	-0.09	-0.09	-0.09	-0.09	-0.09	-0.09	-0.09	-0.09
RUSSIA	0	0	0	0	0	0	0	0	0
USA	-0.0675	-0.0675	-0.0675	-0.0675	-0.0675	-0.0675	-0.0675	-0.0675	-0.0675
Long-Range HFCV	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**	**2050**
AFRICA	0	0	0	0	0	0	0	0	0
ASIA	0	0	0	0	0	0	0	0	0
BRAZIL	0	0	0	0	0	0	0	0	0
CANADA	-0.09	-0.09	-0.09	-0.09	-0.09	-0.09	-0.09	-0.09	-0.09
CHINA	0	0	0	0	0	0	0	0	0
EEUR	-0.09	-0.09	-0.09	-0.09	-0.09	-0.09	-0.09	-0.09	-0.09
WEUR	-0.18	-0.18	-0.18	-0.18	-0.18	-0.18	-0.18	-0.18	-0.18
FSU	0	0	0	0	0	0	0	0	0
INDIA	0	0	0	0	0	0	0	0	0
LAM	0	0	0	0	0	0	0	0	0
MEA	0	0	0	0	0	0	0	0	0
MEXICO	0	0	0	0	0	0	0	0	0
PACIFIC	-0.18	-0.18	-0.18	-0.18	-0.18	-0.18	-0.18	-0.18	-0.18
RUSSIA	0	0	0	0	0	0	0	0	0
USA	-0.135	-0.135	-0.135	-0.135	-0.135	-0.135	-0.135	-0.135	-0.135
Freeway : all = Zero									

Assumed maximum technically feasible MeOH blend (% J) & EtOH blend (max %J)

Freeway & Tollway	2005	2010	2015	2020	2025	2030	2035	2040	2045	2050
MeOH in gasoline	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%
EtOH in gasoline	10%	10%	40%	70%	100%	100%	100%	100%	100%	100%
Biodiesel and FT-diesel in diesel	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

3-Other Surface Transport Sector

Other Surface transport demand (PJ)

Freeway									
	2010	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**	**2050**
Africa	1832	2027	2296	2655	3141	3786	4571	5493	6459
Asia (exl. China, India)	4453	5332	6213	7113	7978	8822	9609	10386	11103
Brazil	1193	1288	1429	1634	1886	2170	2458	2743	2999
Canada	749	790	825	862	897	937	976	1013	1049
China	5186	6439	7720	9054	10265	11348	12346	13376	14273
Non-OECD Europe	375	402	432	465	504	551	602	654	708
OECD Europe	7860	8288	8693	9085	9441	9793	10115	10430	10721
FSU (exl. Russia)	1813	2097	2421	2779	3174	3624	4108	4619	5114
India	1334	1565	1854	2217	2648	3153	3695	4269	4821
LAM (exl. Brazil, Mexico)	3613	4117	4660	5244	5865	6549	7252	7983	8693
MEA	4158	4467	4839	5328	5959	6742	7650	8657	9653
Mexico	1385	1534	1721	1967	2244	2547	2848	3154	3438
OECD Pacific+Asia	2852	2955	3040	3122	3189	3257	3317	3379	3437
Russia	793	883	992	1119	1269	1447	1635	1818	1992
USA	6885	7202	7454	7705	7943	8259	8584	8904	9202
Total	44481	49389	54590	60350	66401	72987	79765	86879	**93662**

Tollway									
Africa	1832	1998	2222	2512	2893	3384	3966	4633	5328
Asia (exl. China, India)	4453	5130	5791	6452	7076	7675	8225	8758	9238
Brazil	1193	1269	1377	1529	1708	1902	2091	2271	2430
Canada	749	782	811	841	869	900	929	958	985
China	5186	6117	7024	7925	8710	9394	10014	10650	11206
Non-OECD Europe	375	394	413	435	459	488	518	547	577
OECD Europe	7860	8184	8487	8776	9036	9290	9520	9742	9945
FSU (exl. Russia)	1813	2010	2225	2452	2692	2953	3224	3500	3759
India	1334	1514	1731	1994	2294	2633	2984	3342	3676
LAM (exl. Brazil, Mexico)	3613	4008	4427	4869	5330	5827	6325	6832	7313
MEA	4158	4428	4749	5157	5667	6285	6986	7748	8494
Mexico	1385	1504	1648	1833	2033	2247	2452	2654	2834
OECD Pacific+Asia	2852	2932	2997	3058	3107	3156	3197	3239	3278
Russia	793	855	926	1005	1095	1197	1301	1398	1487
USA	6885	7148	7366	7580	7784	8038	8295	8547	8783
Total	44481	48272	52193	56418	60755	65368	70026	74819	**79333**

Share of fuelling options at base year 2005 (EJ)

	Africa	**Asia**	**Brazil**	**Canada**	**China**	**EEUR**	**FSU**	**India**	**LAM**	**MEA**	**Mexico**	**Pacific**	**Russia**	**USA**	**WEUR**
Other (Coal)	0.00	0.00	-	-	0.58	-	0.01	-	-	-	-	0.00	-	-	0.00
Gasoline	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Diesel	1.60	4.19	0.97	0.71	3.59	0.28	1.43	0.89	2.91	3.46	1.17	2.99	0.58	6.87	7.80
Biomethanol	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bioethanol	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bio-Syngas	-	-	0.00	-	-	-	-	-	-	-	-	-	-	-	-
CNG	0.05	-	0.06	0.00	-	0.00	0.00	0.03	0.13	0.00	-	0.01	-	0.01	0.00
Biodiesel	-	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-	-	0.00		0.01	
Electricity	0.01	0.00	0.00	0.00	0.03	0.00	0.02	0.01	0.00	-	0.00	0.04	0.08	0.01	0.11
Hydrogen	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bio-Jetfuel	-	-	0.00	-	-	-	-	-	-	-	-	-	-	-	-
Jetfuel	0.32	0.70	0.16	0.25	0.61	0.04	0.08	0.15	0.23	0.48	0.11	0.85	0.43	3.55	2.23
Total	1.98	4.89	1.18	0.96	4.81	0.33	1.54	1.08	3.28	3.94	1.29	3.89	1.10	10.44	10.15

Assumed maximum technically feasible MeOH blend (max % J) & EtOH blend (max %J)

Freeway & Tollway	2010	2015	2020	2025	2030	2035	2040	2045	2050
MeOH in petroleum	10%	10%	10%	10%	10%	10%	10%	10%	10%
EtOH in petroleum	10%	40%	70%	100%	100%	100%	100%	100%	100%
Biodiesel	100%	100%	100%	100%	100%	100%	100%	100%	100%

4-Aviation

Aviation transport demand (PJ)

Freeway									
	2010	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**	**2050**
Africa	399	487	623	830	1155	1667	2413	3461	4763

Asia (exl. China, India)	888	1265	1710	2234	2802	3420	4051	4728	5398
Brazil	186	217	267	348	461	608	778	967	1153
Canada	248	275	300	328	354	387	419	452	485
China	711	1086	1551	2122	2720	3318	3921	4597	5230
Non-OECD Europe	52	60	69	80	93	112	133	157	183
OECD Europe	2306	2563	2818	3076	3321	3572	3810	4051	4279
FSU (exl. Russia)	91	122	161	212	275	358	458	578	707
India	199	272	380	539	765	1078	1474	1959	2491
LAM (exl. Brazil, Mexico)	252	326	417	526	656	817	999	1209	1431
MEA	533	615	721	872	1088	1389	1783	2276	2823
Mexico	134	164	206	268	348	447	557	682	809
OECD Pacific+Asia	830	891	943	994	1037	1082	1122	1164	1204
Russia	492	609	765	971	1246	1614	2055	2533	3037
USA	3205	3506	3755	4011	4261	4606	4974	5350	5714
Total	10526	12457	14685	17411	20583	24474	28948	34164	**39707**

Tollway									
Africa	399	469	572	720	937	1254	1686	2253	2923
Asia (exl. China, India)	888	1156	1450	1775	2110	2458	2799	3149	3482
Brazil	186	209	244	297	365	447	534	623	707
Canada	248	269	288	308	328	350	372	394	415
China	711	966	1251	1567	1871	2156	2431	2729	3003
Non-OECD Europe	52	57	62	69	76	85	95	106	117
OECD Europe	2306	2488	2664	2838	2998	3159	3308	3455	3592
FSU (exl. Russia)	91	111	134	161	191	228	268	313	358
India	199	252	323	421	547	707	893	1104	1319
LAM (exl. Brazil, Mexico)	252	306	369	441	522	617	719	831	945
MEA	533	600	685	799	953	1157	1410	1712	2034
Mexico	134	156	186	226	275	331	390	453	513
OECD Pacific+Asia	830	874	911	947	976	1005	1030	1055	1079
Russia	492	566	657	767	901	1064	1243	1423	1598
USA	3205	3439	3639	3842	4039	4291	4553	4816	5070
Total	10526	11919	13435	15177	17089	19308	21731	24415	**27154**

Assumed maximum technically feasible Blend of biodiesel in aviation fuel (max %J)

Freeway & Tollway	2010	2015	2020	2025	2030	2035	2040	2045	2050
Bio-liquids and synthetic fossil liquids	50%	50%	50%	50%	50%	50%	50%	50%	50%

5-Fuels
Fuels in base year 2005 (EJ)

Fuel	**Africa**	**Asia**	**Brazil**	**Canada**	**China**	**EEUR**	**FSU**	**India**	**LAM**	**MEA**	**Mexico**	**Pacific**	**Russia**	**USA**	**WEUR**
Other (Coal)	-	-	-	-	0.57	-	0.00	-	-	-	-	-	-	-	-
Jetfuels	0.32	0.69	0.15	0.24	0.61	0.04	0.07	0.14	0.23	0.47	0.11	0.85	0.43	3.54	2.23
BioJetfuel	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gasoline	0.90	1.51	0.92	1.18	0.63	0.39	0.60	0.32	0.80	0.99	0.65	2.97	1.16	16.4	5.42
Diesel	1.70	4.19	1.00	0.73	3.72	0.29	1.45	0.98	2.93	3.52	1.17	3.38	0.59	6.93	9.55
Methanol	-	-	-	-	0.03	-	-	-	-	-	-	-	-	-	-
BioMethanol	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BioEthanol	-	0.00	0.19	0.00	0.02	-	-	0.00	0.00	-	-	0.00	-	0.27	0.02
BioSyngas	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CNG	0.05	0.02	0.08	0.001	0.01	-	0.01	0.03	0.19	0.01	-	0.01	0.00	0.01	0.01
Biodiesel	-	-	-	-	-	-	-	-	0.00	-	-	0.01	-	0.01	0.10
Electricity	0.01	-	0.01	0.001	0.03	0.01	0.02	0.01	0.00	-	-	0.03	0.08	0.01	0.11
Hydrogen	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

CO2-emission Factors of fuels (gC/J)

Electricity (gCO2/Kwh)									
Freeway	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**	**2050**
AFRICA	0.0482	0.0463	0.0444	0.0425	0.0406	0.0384	0.0362	0.0340	0.0318
ASIA	0.0550	0.0528	0.0507	0.0485	0.0464	0.0438	0.0413	0.0388	0.0362
BRAZIL	0.0064	0.0061	0.0059	0.0056	0.0054	0.0051	0.0048	0.0045	0.0042
CANADA	0.0148	0.0143	0.0137	0.0131	0.0125	0.0118	0.0112	0.0105	0.0098
CHINA	0.0596	0.0573	0.0550	0.0526	0.0503	0.0475	0.0448	0.0420	0.0393
EEUR	0.0355	0.0341	0.0327	0.0313	0.0299	0.0283	0.0266	0.0250	0.0234
WEUR	0.0256	0.0246	0.0236	0.0226	0.0216	0.0204	0.0192	0.0181	0.0169
FSU	0.0252	0.0242	0.0233	0.0223	0.0213	0.0201	0.0189	0.0178	0.0166
INDIA	0.0710	0.0682	0.0654	0.0626	0.0599	0.0566	0.0533	0.0500	0.0468
LAM	0.0147	0.0141	0.0135	0.0130	0.0124	0.0117	0.0110	0.0104	0.0097

MEA	0.0528	0.0507	0.0487	0.0466	0.0445	0.0421	0.0397	0.0372	0.0348
MEXICO	0.0430	0.0413	0.0396	0.0379	0.0362	0.0342	0.0323	0.0303	0.0283
PACIFIC	0.0379	0.0364	0.0349	0.0334	0.0319	0.0302	0.0285	0.0267	0.0250
RUSSIA	0.0246	0.0237	0.0227	0.0217	0.0208	0.0196	0.0185	0.0174	0.0162
USA	0.0432	0.0415	0.0398	0.0381	0.0364	0.0344	0.0324	0.0304	0.0285
World	507.25	487.38125	467.5125	447.6438	427.775	404.4	381.025	357.65	334.275

Tollway	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**	**2050**
AFRICA	0.0482	0.0430	0.0377	0.0325	0.0273	0.0251	0.0229	0.0162	0.0095
ASIA	0.0550	0.0490	0.0431	0.0371	0.0312	0.0286	0.0261	0.0185	0.0108
BRAZIL	0.0064	0.0057	0.0050	0.0043	0.0036	0.0033	0.0030	0.0021	0.0013
CANADA	0.0148	0.0132	0.0116	0.0100	0.0084	0.0077	0.0070	0.0050	0.0029
CHINA	0.0596	0.0532	0.0467	0.0403	0.0338	0.0310	0.0283	0.0200	0.0118
EEUR	0.0355	0.0316	0.0278	0.0239	0.0201	0.0185	0.0168	0.0119	0.0070
WEUR	0.0256	0.0228	0.0201	0.0173	0.0145	0.0133	0.0122	0.0086	0.0050
FSU	0.0252	0.0225	0.0198	0.0170	0.0143	0.0131	0.0120	0.0085	0.0050
INDIA	0.0710	0.0633	0.0556	0.0479	0.0402	0.0370	0.0337	0.0238	0.0140
LAM	0.0147	0.0131	0.0115	0.0099	0.0083	0.0077	0.0070	0.0049	0.0029
MEA	0.0528	0.0471	0.0414	0.0356	0.0299	0.0275	0.0251	0.0177	0.0104
MEXICO	0.0430	0.0383	0.0337	0.0290	0.0243	0.0224	0.0204	0.0144	0.0085
PACIFIC	0.0379	0.0338	0.0297	0.0256	0.0215	0.0197	0.0180	0.0127	0.0075
RUSSIA	0.0246	0.0220	0.0193	0.0166	0.0140	0.0128	0.0117	0.0083	0.0049
USA	0.0432	0.0385	0.0338	0.0292	0.0245	0.0225	0.0205	0.0145	0.0085
World	507.25	452.31875	397.3875	342.4563	287.525	264.15	240.775	217.4	194.025

Fossil Fuels		Gasoline: 18.9 tC/TJ Diesel: 20.2 tC/TJ Natural gas: 15.3 tC/TJ Jet Kerosene: 19.5 tC/TJ
Hydrogen		80% of emission of electricity per Joule
Biofuels	MeOH, EtOH	10% of gasoline per Joule
	Bio-Diesel	10% of diesel per Joule
	Bio-SNG	10% of CNG per Joule

CO2-taxes-Prices on Fossil Fuels in ($/tC) with ref year 2000

Freeway	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**	**2050**
AFRICA	0	0	0	0	0	20	50	75	113
ASIA	0	0	0	0	0	20	50	75	113
BRAZIL	0	0	20	50	75	113	169	253	380
CANADA	20	50	75	113	169	253	380	570	650
CHINA	0	0	20	50	75	113	169	253	380
EEUR	20	50	75	113	169	253	380	570	650
WEUR	50	75	113	169	253	380	570	650	700
FSU	0	0	20	50	75	113	169	253	380
INDIA	0	0	0	20	50	75	113	169	253
LAM	0	0	0	0	20	50	75	113	169
MEA	0	0	0	0	0	20	50	75	113
MEXICO	0	0	20	50	75	113	169	253	380
PACIFIC	20	50	75	113	169	253	380	570	650
RUSSIA	0	0	20	50	75	113	169	253	380
USA	0	20	50	75	113	169	253	380	570

Tollway	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**	**2050**
AFRICA	0	0	0	0	0	0	0	0	0
ASIA	0	0	0	0	0	0	0	0	0
BRAZIL	0	0	0	0	0	0	0	0	0
CANADA	0	0	0	0	0	0	0	0	0
CHINA	0	0	0	0	0	0	0	0	0
EEUR	0	0	0	0	0	0	0	0	0
WEUR	0	0	0	0	0	0	0	0	0
FSU	0	0	0	0	0	0	0	0	0
INDIA	0	0	0	0	0	0	0	0	0
LAM	0	0	0	0	0	0	0	0	0
MEA	0	0	0	0	0	0	0	0	0
MEXICO	0	0	0	0	0	0	0	0	0
PACIFIC	0	0	0	0	0	0	0	0	0
RUSSIA	0	0	0	0	0	0	0	0	0
USA	0	0	0	0	0	0	0	0	0

In addition to the previous table, we also have:

Timelag w.r.t. WEUR (# of 5 year steps)	
AFRICA	6
ASIA	6
BRAZIL	3

CANADA	1
CHINA	3
EEUR	1
WEUR	0
FSU	3
INDIA	4
LAM	5
MEA	6
MEXICO	3
PACIFIC	1
RUSSIA	3
USA	2

Biofuel targets

Tollway			2015	2020	2025	2030	2035	2040	2045	2050
WEUR	all biofuels	%	5%	10%	10%	10%	10%	10%	10%	10%
BRAZIL	EtOH	%	20%	20%	20%	20%	20%	20%	20%	20%
BRAZIL	Biodiesel	%	5%	5%	5%	5%	5%	5%	5%	5%
CANADA	EtOH	%	5%	5%	5%	5%	5%	5%	5%	5%
CANADA	Biodiesel	%	2%	2%	2%	2%	2%	2%	2%	2%
CHINA	EtOH	%	3%	3%	3%	3%	3%	3%	3%	3%
INDIA	EtOH	%	10%	20%	20%	20%	20%	20%	20%	20%
INDIA	Biodiesel	%		20%	20%	20%	20%	20%	20%	20%
MEXICO	EtOH	%	2%	2%	2%	2%	2%	2%	2%	2%
PACIFIC	EtOH	%	4%	4%	4%	4%	4%	4%	4%	4%
PACIFIC	Biodiesel	%	2%	2%	2%	2%	2%	2%	2%	2%
Others	all biofuels	%		4%	4%	4%	4%	4%	4%	4%
USA	all biofuels	PJ	1552	2725	2725	2725	2725	2725	2725	2725

Freeway			2015	2020	2025	2030	2035	2040	2045	2050
WEUR	all biofuels	%	5%	5%	5%	5%	5%	5%	5%	5%
BRAZIL	EtOH	%	20%	20%	20%	20%	20%	20%	20%	20%
BRAZIL	Biodiesel	%	5%	5%	5%	5%	5%	5%	5%	5%
CANADA	EtOH	%	5%	5%	5%	5%	5%	5%	5%	5%
CANADA	Biodiesel	%	2%	2%	2%	2%	2%	2%	2%	2%
CHINA	EtOH	%	3%	3%	3%	3%	3%	3%	3%	3%
INDIA	EtOH	%	10%	20%	20%	20%	20%	20%	20%	20%
INDIA	Biodiesel	%	-	20%	20%	20%	20%	20%	20%	20%
MEXICO	EtOH	%	2%	2%	2%	2%	2%	2%	2%	2%
PACIFIC	EtOH	%	4%	4%	4%	4%	4%	4%	4%	4%
PACIFIC	Biodiesel	%	2%	2%	2%	2%	2%	2%	2%	2%
rest of world	all biofuels	%	-	2%	2%	2%	2%	2%	2%	2%
USA	all biofuels	PJ	1552	1931	1931	1931	1931	1931	1931	1931

Fuel cost-prices ($2000/GJ)

Freeway	2009	2015	2020	2025	2030	2035	2040	2045	2050
Biodiesel	19.91	24.66	26.04	26.78	27.67	28.30	28.86	29.44	30.03
Bio-Ethanol	16.29	20.18	21.31	21.91	22.64	23.15	23.62	24.09	24.57
Bio-Methanol	15.09	18.69	19.73	20.29	20.97	21.44	21.87	22.31	22.75
Bio-Syngas	16.85	20.87	22.03	22.65	23.41	23.94	24.42	24.91	25.41
Diesel	8.29	10.40	11.51	12.79	13.86	15.00	16.08	17.41	18.86
Gasoline	8.58	12.12	12.74	13.60	14.79	16.06	17.39	18.84	20.41
Coal	1.90	1.99	2.27	2.55	2.92	3.28	3.36	3.43	3.51
Hydrogen	17.82	23.65	23.65	24.24	24.55	24.85	25.16	25.46	25.77
Methanol	9.43	13.31	13.85	14.65	15.76	16.95	18.17	19.49	21.01
Natural Gas	4.38	5.54	5.86	6.18	6.94	7.98	9.07	10.07	11.18
Electricity	21.97	23.43	23.57	24.05	24.98	26.14	26.37	26.74	27.11

Tollway	2009	2015	2020	2025	2030	2035	2040	2045	2050
Biodiesel	19.91	27.12	29.35	29.43	29.67	29.59	29.44	29.29	29.14
Bio-Ethanol	16.29	22.19	24.01	24.08	24.28	24.21	24.09	23.97	23.84
Bio-Methanol	15.09	20.55	22.24	22.30	22.48	22.42	22.31	22.19	22.08
Bio-Syngas	16.85	22.94	24.83	24.90	25.10	25.04	24.91	24.78	24.65
Diesel	8.29	12.26	14.24	16.62	17.57	18.10	17.78	17.66	17.54
Gasoline	8.58	14.23	15.72	17.63	18.69	19.32	19.19	19.05	18.92
Coal	1.90	1.99	2.27	2.55	2.92	3.28	3.36	3.43	3.51
Hydrogen	17.82	25.97	27.29	27.98	27.63	27.35	27.14	26.93	26.71
Methanol	9.43	15.63	17.09	18.98	19.93	20.39	20.05	19.71	19.47
Natural Gas	4.38	6.38	7.09	7.85	8.61	9.42	10.20	10.52	10.84
Electricity	21.97	24.61	25.38	26.55	27.85	28.43	28.68	28.68	28.68

Appendix C: Model's Outputs (Indigenous Variables)

1-Results for the Freeway Scenario

Fuel Demand

Fuel for Cars (EJ/Y)

Fuels for Cars (Units: EJ/y)										
Fuel	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**	**2050**
Electricity	0.0	0.0	0.1	0.1	0.2	0.3	0.4	0.5	0.6	0.7
Hydrogen	0.0	0.0	0.1	0.1	0.2	0.3	0.4	0.4	0.4	0.4
Bio-Syngas	0.0	0.0	0.1	0.2	0.2	0.2	0.3	0.3	0.2	0.1
CNG	0.1	0.3	0.6	1.0	1.4	1.9	2.1	2.4	2.7	2.9
Biofuel(Diesel)	0.1	0.4	0.6	1.0	1.2	0.9	1.0	1.1	1.3	1.2
Diesel	2.7	2.1	2.1	2.2	2.6	4.0	6.3	9.8	14.1	19.4
Methanol	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1
Bio-Methanol	0.0	0.1	0.6	1.2	1.9	2.6	3.3	3.4	3.4	2.5
Bio-Ethanol	0.5	1.4	2.2	3.2	3.7	4.0	3.9	4.4	5.1	4.9
Gasoline	35.0	38.2	40.6	41.7	42.0	41.2	40.3	39.2	36.6	32.1
Total	38.5	42.6	47.0	50.7	53.5	55.5	57.9	61.6	64.6	64.3

Fuels for Cars, Region AFRICA (Units: EJ/y)										
Fuel	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**	**2050**
Electricity	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hydrogen	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bio-Syngas	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CNG	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1
Biofuel(Diesel)	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.0	0.0
Diesel	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.3	0.6	1.2
Methanol	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bio-Methanol	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.2	0.1	0.1
Bio-Ethanol	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1
Gasoline	0.9	1.2	1.5	1.8	2.0	2.1	2.1	2.1	1.9	1.6
Total	1.0	1.3	1.6	2.0	2.4	2.5	2.7	2.8	2.9	3.2

Fuels for Cars, Region ASIA (Units: EJ/y)										
Fuel	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**	**2050**
Electricity	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1
Hydrogen	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1
Bio-Syngas	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0
CNG	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2
Biofuel(Diesel)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1
Diesel	0.0	0.0	0.0	0.0	0.1	0.1	0.3	0.4	1.0	2.1
Bio-Methanol	0.0	0.0	0.0	0.1	0.1	0.2	0.3	0.4	0.5	0.3
Bio-Ethanol	0.0	0.0	0.0	0.1	0.1	0.2	0.3	0.4	0.6	0.3
Gasoline	1.5	1.9	2.3	2.7	3.2	3.9	5.0	6.3	6.6	5.7
Total	1.5	1.9	2.4	3.1	3.7	4.7	6.2	8.0	9.1	8.9

Fuels for Cars, Region BRAZIL (Units: EJ/y)										
Fuel	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**	**2050**
Electricity	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hydrogen	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CNG	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.1
Biofuel(Diesel)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Diesel	0.0	0.1	0.2	0.4	0.6	0.5	0.6	0.7	0.9	1.2
Bio-Methanol	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bio-Ethanol	0.2	0.4	0.3	0.3	0.3	0.3	0.4	0.4	0.3	0.3
Gasoline	0.9	0.9	1.2	1.1	1.1	1.3	1.6	1.7	1.4	1.1
Total	1.2	1.5	1.8	1.9	2.1	2.3	2.7	3.0	2.9	2.7

Fuels for Cars, Region CANADA (Units: EJ/y)										
Fuel	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**	**2050**
Electricity	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hydrogen	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CNG	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1
Biofuel(Diesel)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Diesel	0.0	0.0	0.1	0.1	0.1	0.1	0.2	0.3	0.4	0.5
Bio-Methanol	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bio-Ethanol	0.0	0.0	0.1	0.1	0.1	0.1	0.0	0.1	0.1	0.1

Gasoline	1.2	1.2	1.1	1.1	1.0	0.9	0.8	0.5	0.4	0.3
Total	1.2	1.3	1.3	1.3	1.3	1.2	1.1	1.1	1.0	1.0

Fuels for Cars, Region CHINA (Units: EJ/y)

Fuel	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**	**2050**
Electricity	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Hydrogen	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1
Bio-Syngas	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0
CNG	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.0	0.0	0.1
Biofuel(Diesel)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.2	0.1
Diesel	0.1	0.1	0.2	0.2	0.2	0.2	0.3	0.3	0.6	1.3
Methanol	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0
Bio-Methanol	0.0	0.1	0.1	0.2	0.3	0.4	0.5	0.7	0.9	0.4
Bio-Ethanol	0.0	0.0	0.1	0.1	0.2	0.3	0.4	0.5	0.6	0.3
Gasoline	0.6	0.9	1.4	2.0	3.0	4.3	5.7	7.0	7.8	7.3
Total	0.8	1.2	1.8	2.6	3.7	5.2	7.0	8.9	10.4	9.7

Fuels for Cars, Region EEUR (Units: EJ/y)

Fuel	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**	**2050**
Electricity	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hydrogen	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CNG	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Diesel	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.2	0.3
Bio-Methanol	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bio-Ethanol	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Gasoline	0.4	0.4	0.5	0.5	0.5	0.5	0.4	0.4	0.3	0.2
Total	0.4	0.4	0.5	0.5	0.6	0.6	0.6	0.5	0.5	0.5

Fuels for Cars, Region FSU (Units: EJ/y)

Fuel	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**	**2050**
Electricity	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hydrogen	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bio-Syngas	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CNG	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Biofuel(Diesel)	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.0
Diesel	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.3	0.6
Methanol	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bio-Methanol	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1
Bio-Ethanol	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.2
Gasoline	0.6	0.7	0.8	1.0	1.1	1.3	1.3	1.3	1.0	0.7
Total	0.6	0.8	0.9	1.1	1.3	1.6	1.7	1.8	1.8	1.8

Fuels for Cars, Region INDIA (Units: EJ/y)

Fuel	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**	**2050**
Electricity	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hydrogen	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bio-Syngas	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CNG	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Biofuel(Diesel)	0.0	0.0	0.0	0.0	0.0	0.1	0.2	0.4	0.6	0.8
Diesel	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0
Bio-Methanol	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1
Bio-Ethanol	0.0	0.0	0.1	0.3	0.4	0.5	0.6	0.8	1.0	1.3
Gasoline	0.3	0.5	0.6	0.7	0.9	1.2	1.7	2.3	3.2	3.8
Total	0.4	0.6	0.8	1.1	1.4	1.8	2.5	3.5	5.0	6.1

Fuels for Cars, Region LAM (Units: EJ/y)

Fuel	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**	**2050**
Electricity	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hydrogen	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CNG	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2
Biofuel(Diesel)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Diesel	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.2	0.5	1.0
Bio-Methanol	0.0	0.0	0.0	0.0	0.1	0.1	0.2	0.2	0.2	0.2
Bio-Ethanol	0.0	0.0	0.0	0.1	0.1	0.1	0.2	0.3	0.2	0.1
Gasoline	0.8	1.0	1.2	1.4	1.6	1.7	1.7	1.8	1.8	1.7
Total	0.9	1.1	1.4	1.7	2.0	2.2	2.4	2.7	3.0	3.2

Fuels for Cars, Region MEA (Units: EJ/y)

Fuel	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**	**2050**
Electricity	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hydrogen	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bio-Syngas	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CNG	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1
Diesel	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.3	0.6	1.0
Bio-Methanol	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.2	0.2	0.1

Bio-Ethanol	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.1	0.1
Gasoline	1.0	1.2	1.4	1.7	1.9	2.0	2.1	1.9	1.5	1.1
Total	1.1	1.3	1.5	1.9	2.1	2.4	2.5	2.6	2.4	2.4

Fuels for Cars, Region MEXICO (Units: EJ/y)

Fuel	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**	**2050**
Electricity	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hydrogen	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bio-Syngas	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CNG	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Biofuel(Diesel)	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0
Diesel	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.3	0.6
Bio-Methanol	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.2	0.1	0.1
Bio-Ethanol	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.2	0.1	0.1
Gasoline	0.7	0.8	0.9	1.0	1.1	1.2	1.3	1.3	1.1	0.9
Total	0.7	0.8	1.0	1.1	1.2	1.4	1.7	1.8	1.8	1.7

Fuels for Cars, Region PACIFIC (Units: EJ/y)

Fuel	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**	**2050**
Electricity	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hydrogen	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bio-Syngas	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CNG	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.2	0.2
Biofuel(Diesel)	0.0	0.0	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.1
Diesel	0.4	0.3	0.3	0.2	0.2	0.4	0.6	0.7	0.9	0.9
Bio-Methanol	0.0	0.0	0.2	0.3	0.3	0.2	0.2	0.1	0.1	0.0
Bio-Ethanol	0.0	0.0	0.1	0.2	0.3	0.3	0.2	0.1	0.1	0.0
Gasoline	3.0	3.2	3.1	2.7	2.3	1.8	1.5	1.3	1.1	1.0
Total	3.4	3.6	3.7	3.6	3.4	3.0	2.7	2.5	2.3	2.2

Fuels for Cars, Region RUSSIA (Units: EJ/y)

Fuel	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**	**2050**
Electricity	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hydrogen	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bio-Syngas	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0
CNG	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1
Biofuel(Diesel)	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0
Diesel	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.3	0.7	1.0
Methanol	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bio-Methanol	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1
Bio-Ethanol	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.2	0.2
Gasoline	1.2	1.4	1.5	1.7	1.8	1.8	1.7	1.4	1.0	0.7
Total	1.2	1.4	1.6	1.8	2.0	2.2	2.3	2.2	2.1	2.1

Fuels for Cars, Region USA (Units: EJ/y)

Fuel	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**	**2050**
Electricity	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.2	0.2	0.3
Hydrogen	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1
Bio-Syngas	0.0	0.0	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0
CNG	0.0	0.0	0.1	0.3	0.5	0.7	0.7	0.7	0.7	0.8
Diesel	0.1	0.1	0.2	0.4	0.7	1.2	2.3	3.9	5.0	5.8
Bio-Methanol	0.0	0.0	0.1	0.3	0.5	0.8	1.1	0.9	0.7	0.6
Bio-Ethanol	0.3	0.8	1.1	1.5	1.4	1.1	0.8	1.1	1.2	1.4
Gasoline	16.5	16.7	16.4	15.7	14.8	12.6	9.6	6.7	4.8	3.6
Total	16.8	17.6	18.1	18.4	18.0	16.6	14.7	13.4	12.7	12.4

Fuels for Cars, Region WEUR (Units: EJ/y)

Fuel	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**	**2050**
Electricity	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1
Hydrogen	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bio-Syngas	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CNG	0.0	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.8	0.9
Biofuel(Diesel)	0.1	0.4	0.5	0.8	0.9	0.4	0.3	0.2	0.1	0.1
Diesel	1.8	1.2	0.9	0.6	0.5	1.2	1.6	1.9	2.1	1.9
Bio-Methanol	0.0	0.0	0.1	0.2	0.3	0.5	0.5	0.4	0.3	0.3
Bio-Ethanol	0.0	0.1	0.2	0.4	0.6	0.7	0.6	0.3	0.4	0.5
Gasoline	5.4	6.2	6.7	6.4	5.7	4.5	3.8	3.4	2.7	2.6
Total	7.3	7.9	8.6	8.6	8.3	7.7	7.2	6.8	6.5	6.4

Fuel for Other Surface Transport and Aviation (EJ/Y)

Fuel in Other Surface Transport and Aviation (Units: EJ/y)										
Fuel	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**	**2050**
Other (Coal)	0.6	0.8	1.0	1.2	1.4	1.3	0.4	0.1	0.0	0.0
Gasoline	0.0	0.0	0.3	0.4	0.5	0.4	0.3	0.2	0.0	0.0
Diesel	39.5	40.1	42.5	45.3	48.4	51.4	55.3	59.4	63.4	66.2
Bio-Methanol	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bio-Ethanol	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bio-Syngas	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CNG	0.3	0.4	0.3	0.3	0.4	0.5	0.7	0.8	1.1	1.4
Biofuel(Diesel)	0.0	0.2	0.4	0.4	0.4	0.4	0.4	0.2	0.1	0.1
Electricity	0.3	0.3	0.5	0.8	1.2	2.0	2.8	3.7	4.6	5.7
Hydrogen	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bio-FT-Jetfuel	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1
Jetfuel	10.2	10.7	12.4	14.6	17.1	19.7	22.8	26.4	30.6	34.9
Total	50.9	52.5	57.6	63.1	69.5	75.8	82.8	90.9	99.8	108.5

Fuel in Other Surface Transport and Aviation, Region AFRICA (Units: EJ/y)										
Fuel	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**	**2050**
Other (Coal)	0.0	0.0	0.1	0.1	0.1	0.2	0.0	0.0	0.0	0.0
Diesel	1.6	1.6	1.7	1.9	2.1	2.4	2.8	3.4	4.0	4.6
Bio-Methanol	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bio-Ethanol	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bio-Syngas	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CNG	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Biofuel(Diesel)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Electricity	0.0	0.0	0.0	0.0	0.1	0.1	0.2	0.2	0.3	0.4
Hydrogen	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Jetfuel	0.3	0.4	0.5	0.6	0.8	1.1	1.5	2.2	3.0	4.1
Total	2.0	2.1	2.3	2.7	3.2	3.8	4.6	5.8	7.4	9.2

Fuel in Other Surface Transport and Aviation, Region ASIA (Units: EJ/y)										
Fuel	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**	**2050**
Other (Coal)	0.0	0.0	0.1	0.1	0.1	0.2	0.0	0.0	0.0	0.0
Diesel	4.2	4.1	4.8	5.4	6.0	6.6	7.2	7.7	8.0	8.0
Bio-Methanol	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bio-Ethanol	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bio-Syngas	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CNG	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Biofuel(Diesel)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Electricity	0.0	0.0	0.0	0.0	0.1	0.1	0.2	0.3	0.4	0.7
Hydrogen	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Jetfuel	0.7	0.9	1.3	1.7	2.2	2.7	3.2	3.7	4.2	4.7
Total	4.9	5.1	6.1	7.2	8.4	9.6	10.6	11.6	12.6	13.4

Fuel in Other Surface Transport and Aviation, Region BRAZIL (Units: EJ/y)										
Fuel	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**	**2050**
Other (Coal)	0.0	0.0	0.1	0.1	0.1	0.2	0.0	0.0	0.0	0.0
Diesel	1.0	1.0	1.0	1.1	1.2	1.3	1.5	1.7	1.9	2.0
Bio-Methanol	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bio-Ethanol	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bio-Syngas	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CNG	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Biofuel(Diesel)	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Electricity	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.2	0.2	0.2
Hydrogen	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bio-FT-Jetfuel	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Jetfuel	0.2	0.2	0.2	0.2	0.3	0.4	0.5	0.7	0.8	1.0
Total	1.2	1.3	1.4	1.6	1.8	2.1	2.3	2.6	3.0	3.4

Fuel in Other Surface Transport and Aviation, Region CANADA (Units: EJ/y)										
Fuel	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**	**2050**
Other (Coal)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Diesel	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.8
CNG	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Biofuel(Diesel)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Electricity	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1
Hydrogen	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bio-FT-Jetfuel	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Jetfuel	0.2	0.2	0.3	0.3	0.3	0.3	0.4	0.4	0.4	0.4
Total	2.1	2.2	2.4	2.6	2.9	3.2	3.4	3.8	4.2	4.6

Fuel in Other Surface Transport and Aviation, Region CHINA (Units: EJ/y)

Fuel	2005	2010	2015	2020	2025	2030	2035	2040	2045	2050
Other (Coal)	0.6	0.6	0.6	0.7	0.7	0.7	0.2	0.1	0.0	0.0
Diesel	3.6	4.6	5.5	6.5	7.4	8.1	8.8	9.5	10.0	10.3
Bio-Syngas	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CNG	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Biofuel(Diesel)	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0
Electricity	0.0	0.0	0.1	0.1	0.1	0.2	0.4	0.5	0.7	0.9
Hydrogen	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Jetfuel	0.6	0.7	1.1	1.5	2.1	2.6	3.1	3.6	4.1	4.6
Total	7.0	8.2	9.7	11.4	13.2	14.9	16.0	17.4	19.0	20.4

Fuel in Other Surface Transport and Aviation, Region EEUR (Units: EJ/y)

Fuel	2005	2010	2015	2020	2025	2030	2035	2040	2045	2050
Other (Coal)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Diesel	0.3	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.5	0.5
CNG	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Biofuel(Diesel)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Electricity	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hydrogen	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Jetfuel	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2
Total	7.9	9.3	11.2	13.3	15.7	18.0	19.6	21.6	23.8	25.7

Fuel in Other Surface Transport and Aviation, Region FSU (Units: EJ/y)

Fuel	2005	2010	2015	2020	2025	2030	2035	2040	2045	2050
Other (Coal)	0.0	0.0	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0
Diesel	1.4	1.6	1.8	2.0	2.2	2.4	2.6	2.9	3.2	3.4
Bio-Syngas	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CNG	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.2	0.3
Biofuel(Diesel)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Electricity	0.0	0.0	0.0	0.0	0.1	0.1	0.2	0.2	0.3	0.3
Hydrogen	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Jetfuel	0.1	0.1	0.1	0.2	0.2	0.3	0.3	0.4	0.5	0.6
Total	9.4	11.0	13.3	15.7	18.4	20.9	22.9	25.2	27.9	30.3

Fuel in Other Surface Transport and Aviation, Region INDIA (Units: EJ/y)

Fuel	2005	2010	2015	2020	2025	2030	2035	2040	2045	2050
Other (Coal)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Gasoline	0.0	0.0	0.2	0.4	0.5	0.4	0.3	0.2	0.0	0.0
Diesel	0.9	1.1	0.8	0.7	0.8	1.2	1.5	2.0	2.5	2.7
Bio-Methanol	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bio-Ethanol	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CNG	0.0	0.1	0.1	0.2	0.2	0.3	0.4	0.5	0.7	0.9
Biofuel(Diesel)	0.0	0.0	0.2	0.2	0.2	0.2	0.2	0.1	0.0	0.0
Electricity	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.2	0.2	0.3
Hydrogen	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bio-FT-Jetfuel	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Jetfuel	0.1	0.2	0.3	0.4	0.5	0.7	1.0	1.3	1.7	2.2
Total	1.1	1.4	1.7	2.0	2.4	2.9	3.6	4.3	5.1	6.0

Fuel in Other Surface Transport and Aviation, Region LAM (Units: EJ/y)

Fuel	2005	2010	2015	2020	2025	2030	2035	2040	2045	2050
Other (Coal)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Diesel	2.9	3.2	3.6	4.0	4.4	4.8	5.3	5.7	6.0	6.2
Bio-Methanol	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bio-Ethanol	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CNG	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0
Biofuel(Diesel)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Electricity	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.2	0.4	0.5
Hydrogen	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Jetfuel	0.2	0.3	0.3	0.4	0.5	0.6	0.8	0.9	1.1	1.3
Total	3.3	3.6	4.0	4.5	5.0	5.6	6.2	6.9	7.5	8.1

Fuel in Other Surface Transport and Aviation, Region MEA (Units: EJ/y)

Fuel	2005	2010	2015	2020	2025	2030	2035	2040	2045	2050
Other (Coal)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Gasoline	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Diesel	3.5	3.8	4.0	4.2	4.5	5.0	5.6	6.2	6.7	7.2
Bio-Methanol	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bio-Ethanol	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bio-Syngas	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CNG	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Biofuel(Diesel)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Electricity	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.2	0.3	0.5
Hydrogen	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Jetfuel	0.5	0.5	0.6	0.7	0.9	1.1	1.3	1.6	2.0	2.5

Total	3.9	4.4	4.6	5.0	5.5	6.1	7.0	8.0	9.1	10.2

Fuel in Other Surface Transport and Aviation, Region MEXICO (Units: EJ/y)

Fuel	2005	2010	2015	2020	2025	2030	2035	2040	2045	2050
Other (Coal)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Diesel	1.2	1.3	1.4	1.5	1.6	1.8	2.0	2.2	2.3	2.5
CNG	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Biofuel(Diesel)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Electricity	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.2	0.2
Hydrogen	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Jetfuel	0.1	0.1	0.2	0.2	0.3	0.3	0.4	0.5	0.6	0.7
Total	5.7	6.4	6.8	7.4	8.3	9.4	10.8	12.4	14.2	16.0

Fuel in Other Surface Transport and Aviation, Region PACIFIC (Units: EJ/y)

Fuel	2005	2010	2015	2020	2025	2030	2035	2040	2045	2050
Other (Coal)	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0
Gasoline	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Diesel	3.0	2.7	2.4	2.5	2.5	2.4	2.4	2.4	2.4	2.5
Bio-Methanol	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bio-Ethanol	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CNG	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Biofuel(Diesel)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Electricity	0.0	0.0	0.0	0.1	0.1	0.2	0.2	0.2	0.2	0.2
Hydrogen	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bio-FT-Jetfuel	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Jetfuel	0.9	0.8	0.9	0.9	1.0	1.0	1.0	1.1	1.1	1.1
Total	3.9	3.6	3.6	3.6	3.7	3.6	3.6	3.7	3.7	3.8

Fuel in Other Surface Transport and Aviation, Region RUSSIA (Units: EJ/y)

Fuel	2005	2010	2015	2020	2025	2030	2035	2040	2045	2050
Other (Coal)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Diesel	0.6	0.6	0.9	0.9	0.8	0.9	1.0	1.1	1.2	1.3
Bio-Syngas	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CNG	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.2
Electricity	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Hydrogen	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Jetfuel	0.4	0.5	0.6	0.8	0.9	1.2	1.5	1.9	2.2	2.7
Total	5.8	5.6	6.1	6.3	6.5	6.8	7.3	7.9	8.5	9.1

Fuel in Other Surface Transport and Aviation, Region USA (Units: EJ/y)

Fuel	2005	2010	2015	2020	2025	2030	2035	2040	2045	2050
Other (Coal)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Diesel	6.9	6.3	6.3	6.4	6.5	6.5	6.5	6.3	6.4	6.6
Bio-Methanol	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bio-Ethanol	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bio-Syngas	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CNG	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Biofuel(Diesel)	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Electricity	0.0	0.0	0.0	0.1	0.1	0.2	0.3	0.5	0.6	0.6
Hydrogen	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Jetfuel	3.5	3.4	3.5	3.7	4.0	4.1	4.4	4.6	4.9	5.1
Total	10.4	9.7	10.0	10.3	10.6	10.8	11.1	11.5	11.9	12.3

Fuel in Other Surface Transport and Aviation, Region WEUR (Units: EJ/y)

Fuel	2005	2010	2015	2020	2025	2030	2035	2040	2045	2050
Other (Coal)	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0
Diesel	7.8	7.1	7.2	7.2	7.1	6.9	7.1	7.3	7.5	7.7
Bio-Methanol	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bio-Ethanol	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CNG	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Electricity	0.1	0.1	0.1	0.2	0.4	0.6	0.6	0.6	0.7	0.7
Hydrogen	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Jetfuel	2.2	2.3	2.6	2.8	3.0	3.2	3.4	3.6	3.7	3.9
Total	20.6	19.3	19.9	20.6	21.2	21.5	22.3	23.0	23.8	24.6

Fuel for All Transport (EJ/Y)

Fuels in All Transport (Units: EJ/y)										
Fuel	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**	**2050**
Other (Coal)	0.6	0.8	1.0	1.2	1.4	1.3	0.4	0.1	0.0	0.0
Jetfuels	10.2	10.7	12.4	14.6	17.1	19.7	22.8	26.4	30.6	34.9
Bio-Jetfuels	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1
Gasoline	35.0	38.2	40.9	42.1	42.5	41.6	40.6	39.4	36.6	32.1
Diesel	42.2	42.2	44.6	47.5	51.0	55.5	61.7	69.2	77.5	85.6
Methanol	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1
Bio-Methanol	0.0	0.1	0.7	1.2	1.9	2.6	3.3	3.4	3.4	2.5
Bio-Ethanol	0.5	1.4	2.4	3.3	3.7	4.0	3.9	4.4	5.1	4.9
Bio-Syngas	0.0	0.0	0.1	0.2	0.2	0.2	0.3	0.3	0.2	0.1
CNG	0.4	0.7	0.9	1.3	1.8	2.4	2.8	3.2	3.8	4.4
Biofuel(Diesel)	0.1	0.5	1.1	1.4	1.6	1.2	1.4	1.3	1.4	1.3
Electricity	0.3	0.3	0.5	0.9	1.4	2.3	3.2	4.1	5.2	6.4
Hydrogen	0.0	0.0	0.1	0.1	0.2	0.3	0.4	0.4	0.4	0.4
total	89.4	95.1	104.6	113.7	123.0	131.3	140.8	152.5	164.4	172.8

Fuels in All Transport, Region AFRICA (Units: EJ/y)										
Fuel	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**	**2050**
Other (Coal)	0.0	0.0	0.1	0.1	0.1	0.2	0.0	0.0	0.0	0.0
Jetfuels	0.3	0.4	0.5	0.6	0.8	1.1	1.5	2.2	3.0	4.1
Gasoline	0.9	1.2	1.5	1.8	2.0	2.1	2.1	2.1	1.9	1.6
Diesel	1.7	1.7	1.8	2.0	2.2	2.5	2.9	3.7	4.6	5.9
Methanol	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bio-Methanol	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.2	0.1	0.1
Bio-Ethanol	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1
Bio-Syngas	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CNG	0.0	0.0	0.1	0.1	0.0	0.0	0.1	0.1	0.1	0.1
Biofuel(Diesel)	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.0	0.0
Electricity	0.0	0.0	0.0	0.0	0.1	0.1	0.2	0.3	0.4	0.4
Hydrogen	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
total	3.0	3.4	4.0	4.7	5.5	6.3	7.3	8.6	10.3	12.4

Fuels in All Transport, Region ASIA (Units: EJ/y)										
Fuel	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**	**2050**
Other (Coal)	0.0	0.0	0.1	0.1	0.1	0.2	0.0	0.0	0.0	0.0
Jetfuels	0.7	0.9	1.3	1.7	2.2	2.7	3.2	3.7	4.2	4.7
Gasoline	1.5	1.9	2.3	2.7	3.2	3.9	5.0	6.3	6.6	5.7
Diesel	4.2	4.1	4.8	5.4	6.1	6.7	7.4	8.1	8.9	10.1
Bio-Methanol	0.0	0.0	0.0	0.1	0.1	0.2	0.3	0.4	0.5	0.3
Bio-Ethanol	0.0	0.0	0.0	0.1	0.1	0.2	0.3	0.4	0.6	0.3
Bio-Syngas	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0
CNG	0.0	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.2	0.2
Biofuel(Diesel)	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1
Electricity	0.0	0.0	0.0	0.0	0.1	0.1	0.2	0.3	0.5	0.8
Hydrogen	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1
total	6.4	7.0	8.6	10.3	12.2	14.2	16.8	19.6	21.8	22.3

Fuels in All Transport, Region BRAZIL (Units: EJ/y)										
Fuel	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**	**2050**
Other (Coal)	0.0	0.0	0.1	0.1	0.1	0.2	0.0	0.0	0.0	0.0
Jetfuels	0.2	0.2	0.2	0.2	0.3	0.4	0.5	0.7	0.8	1.0
Bio-Jetfuels	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Gasoline	0.9	0.9	1.2	1.1	1.1	1.3	1.6	1.7	1.4	1.1
Diesel	1.0	1.1	1.2	1.5	1.8	1.9	2.1	2.3	2.8	3.2
Bio-Methanol	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bio-Ethanol	0.2	0.4	0.3	0.3	0.3	0.3	0.4	0.4	0.3	0.3
Bio-Syngas	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CNG	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2
Biofuel(Diesel)	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Electricity	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.2	0.2	0.2
Hydrogen	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
total	2.4	2.8	3.2	3.5	3.9	4.4	5.0	5.6	5.9	6.1

Fuels in All Transport, Region CANADA (Units: EJ/y)										
Fuel	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**	**2050**
Other (Coal)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Jetfuels	0.2	0.2	0.3	0.3	0.3	0.3	0.4	0.4	0.4	0.4
Bio-Jetfuels	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Gasoline	1.2	1.2	1.1	1.1	1.0	0.9	0.8	0.5	0.4	0.3
Diesel	0.7	0.7	0.8	0.8	0.8	0.8	0.9	1.0	1.1	1.2
Bio-Methanol	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Bio-Ethanol	0.0	0.0	0.1	0.1	0.1	0.1	0.0	0.1	0.1	0.1
CNG	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1
Biofuel(Diesel)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Electricity	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1
Hydrogen	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
total	2.2	2.2	2.3	2.4	2.4	2.3	2.2	2.2	2.2	2.3

Fuels in All Transport, Region CHINA (Units: EJ/y)

Fuel	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**	**2050**
Other (Coal)	0.6	0.6	0.6	0.7	0.7	0.7	0.2	0.1	0.0	0.0
Jetfuels	0.6	0.7	1.1	1.5	2.1	2.6	3.1	3.6	4.1	4.6
Gasoline	0.6	0.9	1.4	2.0	3.0	4.3	5.7	7.0	7.8	7.3
Diesel	3.7	4.7	5.7	6.6	7.6	8.3	9.1	9.8	10.6	11.6
Methanol	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0
Bio-Methanol	0.0	0.1	0.1	0.2	0.3	0.4	0.5	0.7	0.9	0.4
Bio-Ethanol	0.0	0.0	0.1	0.1	0.2	0.3	0.4	0.5	0.6	0.3
Bio-Syngas	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0
CNG	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.0	0.0	0.1
Biofuel(Diesel)	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.2	0.1
Electricity	0.0	0.0	0.1	0.1	0.2	0.3	0.4	0.6	0.7	0.9
Hydrogen	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1
total	5.6	7.1	9.1	11.4	14.0	16.9	19.6	22.5	25.2	25.5

Fuels in All Transport, Region EEUR (Units: EJ/y)

Fuel	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**	**2050**
Other (Coal)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Jetfuels	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2
Gasoline	0.4	0.4	0.5	0.5	0.5	0.5	0.4	0.4	0.3	0.2
Diesel	0.3	0.3	0.4	0.4	0.4	0.4	0.5	0.6	0.7	0.8
Bio-Methanol	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bio-Ethanol	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CNG	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Biofuel(Diesel)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Electricity	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hydrogen	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
total	0.7	0.8	0.9	1.0	1.0	1.1	1.1	1.1	1.2	1.2

Fuels in All Transport, Region FSU (Units: EJ/y)

Fuel	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**	**2050**
Other (Coal)	0.0	0.0	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0
Jetfuels	0.1	0.1	0.1	0.2	0.2	0.3	0.3	0.4	0.5	0.6
Gasoline	0.6	0.7	0.8	1.0	1.1	1.3	1.3	1.3	1.0	0.7
Diesel	1.5	1.6	1.8	2.0	2.2	2.4	2.6	3.0	3.5	4.1
Methanol	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bio-Methanol	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1
Bio-Ethanol	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.2
Bio-Syngas	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CNG	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.2	0.2	0.3
Biofuel(Diesel)	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.0
Electricity	0.0	0.0	0.0	0.0	0.1	0.1	0.2	0.3	0.3	0.3
Hydrogen	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
total	2.2	2.5	2.9	3.4	3.9	4.5	5.0	5.5	5.9	6.4

Fuels in All Transport, Region INDIA (Units: EJ/y)

Fuel	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**	**2050**
Other (Coal)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Jetfuels	0.1	0.2	0.3	0.4	0.5	0.7	1.0	1.3	1.7	2.2
Bio-Jetfuels	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Gasoline	0.3	0.5	0.8	1.1	1.5	1.7	2.0	2.5	3.2	3.8
Diesel	1.0	1.2	0.9	0.8	0.9	1.2	1.5	2.0	2.5	2.7
Bio-Methanol	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1
Bio-Ethanol	0.0	0.0	0.2	0.3	0.4	0.5	0.6	0.8	1.0	1.3
Bio-Syngas	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CNG	0.0	0.1	0.1	0.2	0.3	0.3	0.4	0.6	0.7	0.9
Biofuel(Diesel)	0.0	0.0	0.2	0.2	0.2	0.3	0.4	0.5	0.6	0.8
Electricity	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.2	0.2	0.3
Hydrogen	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
total	1.5	2.0	2.5	3.1	3.8	4.8	6.1	7.9	10.1	12.1

Fuels in All Transport, Region LAM (Units: EJ/y)

Fuel	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**	**2050**
Other (Coal)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Jetfuels	0.2	0.3	0.3	0.4	0.5	0.6	0.8	0.9	1.1	1.3
Gasoline	0.8	1.0	1.2	1.4	1.6	1.7	1.7	1.8	1.8	1.7
Diesel	2.9	3.2	3.6	4.0	4.5	4.9	5.4	5.9	6.5	7.2

Bio-Methanol	0.0	0.0	0.0	0.0	0.1	0.1	0.2	0.2	0.2	0.2
Bio-Ethanol	0.0	0.0	0.0	0.1	0.1	0.1	0.2	0.3	0.2	0.1
CNG	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Biofuel(Diesel)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Electricity	0.0	0.0	0.0	0.0	0.1	0.1	0.2	0.3	0.4	0.6
Hydrogen	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
total	4.2	4.7	5.4	6.2	7.0	7.7	8.7	9.6	10.4	11.3

Fuels in All Transport, Region MEA (Units: EJ/y)

Fuel	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**	**2050**
Other (Coal)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Jetfuels	0.5	0.5	0.6	0.7	0.9	1.1	1.3	1.6	2.0	2.5
Gasoline	1.0	1.2	1.5	1.7	1.9	2.0	2.1	1.9	1.5	1.1
Diesel	3.5	3.9	4.0	4.2	4.6	5.1	5.7	6.5	7.3	8.2
Bio-Methanol	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.2	0.2	0.1
Bio-Ethanol	0.0	0.0	0.0	0.1	0.1	0.1	0.0	0.0	0.1	0.1
Bio-Syngas	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CNG	0.0	0.1	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1
Biofuel(Diesel)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Electricity	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.2	0.3	0.5
Hydrogen	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
total	5.0	5.7	6.2	6.8	7.6	8.5	9.5	10.5	11.5	12.6

Fuels in All Transport, Region MEXICO (Units: EJ/y)

Fuel	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**	**2050**
Other (Coal)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Jetfuels	0.1	0.1	0.2	0.2	0.3	0.3	0.4	0.5	0.6	0.7
Gasoline	0.7	0.8	0.9	1.0	1.1	1.2	1.3	1.3	1.1	0.9
Diesel	1.2	1.3	1.4	1.5	1.7	1.8	2.1	2.3	2.7	3.1
Bio-Methanol	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.2	0.1	0.1
Bio-Ethanol	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.2	0.1	0.1
Bio-Syngas	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CNG	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Biofuel(Diesel)	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0
Electricity	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.2	0.2
Hydrogen	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
total	1.9	2.2	2.5	2.8	3.2	3.6	4.2	4.6	4.9	5.1

Fuels in All Transport, Region PACIFIC (Units: EJ/y)

Fuel	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**	**2050**
Other (Coal)	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0
Jetfuels	0.9	0.8	0.9	0.9	1.0	1.0	1.0	1.1	1.1	1.1
Bio-Jetfuels	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Gasoline	3.0	3.2	3.1	2.7	2.3	1.8	1.5	1.3	1.1	1.0
Diesel	3.4	3.1	2.7	2.7	2.7	2.8	2.9	3.1	3.3	3.4
Bio-Methanol	0.0	0.0	0.2	0.3	0.3	0.2	0.2	0.1	0.1	0.0
Bio-Ethanol	0.0	0.0	0.2	0.2	0.3	0.3	0.2	0.1	0.1	0.0
Bio-Syngas	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CNG	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.2	0.2
Biofuel(Diesel)	0.0	0.0	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.1
Electricity	0.0	0.0	0.0	0.1	0.1	0.2	0.2	0.2	0.2	0.3
Hydrogen	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
total	7.3	7.2	7.2	7.3	7.1	6.6	6.3	6.2	6.1	6.0

Fuels in All Transport, Region RUSSIA (Units: EJ/y)

Fuel	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**	**2050**
Other (Coal)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Jetfuels	0.4	0.5	0.6	0.8	0.9	1.2	1.5	1.9	2.2	2.7
Gasoline	1.2	1.4	1.5	1.7	1.8	1.8	1.7	1.4	1.0	0.7
Diesel	0.6	0.6	0.9	0.9	0.8	0.9	1.1	1.4	1.9	2.2
Methanol	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bio-Methanol	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1
Bio-Ethanol	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.2	0.2
Bio-Syngas	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0
CNG	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.2	0.2
Biofuel(Diesel)	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0
Electricity	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2
Hydrogen	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
total	2.3	2.6	3.2	3.5	3.9	4.4	4.9	5.3	5.8	6.4

Fuels in All Transport, Region USA (Units: EJ/y)

Fuel	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**	**2050**
Other (Coal)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Jetfuels	3.5	3.4	3.5	3.7	4.0	4.1	4.4	4.6	4.9	5.1
Gasoline	16.5	16.7	16.4	15.7	14.8	12.6	9.6	6.7	4.8	3.6

Diesel	6.9	6.3	6.5	6.8	7.2	7.6	8.7	10.2	11.5	12.4
Bio-Methanol	0.0	0.0	0.1	0.3	0.5	0.8	1.1	0.9	0.7	0.6
Bio-Ethanol	0.3	0.8	1.1	1.5	1.4	1.1	0.8	1.1	1.2	1.4
Bio-Syngas	0.0	0.0	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0
CNG	0.0	0.0	0.1	0.3	0.5	0.7	0.7	0.7	0.7	0.8
Biofuel(Diesel)	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Electricity	0.0	0.0	0.1	0.1	0.2	0.3	0.4	0.7	0.8	0.8
Hydrogen	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1
total	27.3	27.3	28.1	28.6	28.6	27.4	25.8	24.9	24.6	24.7

Fuels in All Transport, Region WEUR (Units: EJ/y)

Fuel	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**	**2050**
Other (Coal)	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0
Jetfuels	2.2	2.3	2.6	2.8	3.0	3.2	3.4	3.6	3.7	3.9
Gasoline	5.4	6.2	6.7	6.4	5.7	4.5	3.8	3.4	2.7	2.6
Diesel	9.6	8.4	8.1	7.8	7.6	8.1	8.8	9.2	9.6	9.6
Bio-Methanol	0.0	0.0	0.1	0.2	0.3	0.5	0.5	0.4	0.3	0.3
Bio-Ethanol	0.0	0.1	0.2	0.4	0.6	0.7	0.6	0.3	0.4	0.5
Bio-Syngas	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CNG	0.0	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.8	1.0
Biofuel(Diesel)	0.1	0.4	0.5	0.8	0.9	0.4	0.3	0.2	0.1	0.1
Electricity	0.1	0.1	0.1	0.2	0.4	0.6	0.6	0.7	0.7	0.7
Hydrogen	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
total	17.5	17.5	18.5	18.9	19.0	18.5	18.4	18.3	18.4	18.6

Technology Mix (billion v-km/y)

Technology Mix of Mileage for Cars (Units: billion v-km/y)

Technology	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**	**2050**
Electric Vehicle	0	0	22	61	113	171	234	308	368	442
Hydrogen Fuel Cell	0	0	8	23	49	80	110	126	133	117
Hydrogen Hybrid	0	0	31	68	147	229	264	286	282	270
Gas Fuel Hybrid	0	0	99	208	329	463	610	772	952	1150
Gas Fuel ICEV	51	104	214	335	469	617	673	740	762	755
Liquid Fuel Plug-in	0	0	94	199	316	447	575	720	883	1077
Liquid Fuel Hybrid	11	80	333	599	903	1249	1643	2091	2602	3184
Liquid Fuel ICEV	10652	11788	12930	13941	14919	16097	17865	20067	22522	24181
Total	10714	11972	13732	15436	17246	19353	21973	25110	28503	31175

Technology Mix of Mileage for Cars, Region AFRICA (Units: billion v-km/y)

Technology	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**	**2050**
Electric Vehicle	0	0	1	4	9	13	18	24	24	24
Hydrogen Fuel Cell	0	0	1	4	9	13	14	12	10	9
Hydrogen Hybrid	0	0	3	5	9	12	16	20	18	15
Gas Fuel Hybrid	0	0	3	5	9	12	16	20	25	30
Gas Fuel ICEV	1	3	6	10	13	17	22	27	23	20
Liquid Fuel Plug-in	0	0	3	7	12	17	22	28	35	43
Liquid Fuel Hybrid	0	2	9	17	25	35	46	58	73	89
Liquid Fuel ICEV	222	282	355	444	532	599	684	809	1036	1344
Total	223	288	381	498	617	719	838	999	1244	1574

Technology Mix of Mileage for Cars, Region ASIA (Units: billion v-km/y)

Technology	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**	**2050**
Electric Vehicle	0	0	2	8	15	24	33	43	55	68
Hydrogen Fuel Cell	0	0	2	3	7	14	22	31	36	31
Hydrogen Hybrid	0	0	5	10	16	22	29	37	45	39
Gas Fuel Hybrid	0	0	5	10	16	22	29	37	45	55
Gas Fuel ICEV	8	15	21	28	36	44	53	64	75	65
Liquid Fuel Plug-in	0	0	6	13	21	30	40	51	63	77
Liquid Fuel Hybrid	0	4	17	31	46	63	83	106	132	162
Liquid Fuel ICEV	397	494	627	793	990	1287	1755	2399	3040	3448
Total	404	512	684	896	1147	1506	2045	2768	3492	3945

Technology Mix of Mileage for Cars, Region BRAZIL (Units: billion v-km/y)

Technology	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**	**2050**
Electric Vehicle	0	0	1	2	3	5	7	12	14	16
Hydrogen Fuel Cell	0	0	0	0	0	0	0	0	0	0
Hydrogen Hybrid	0	0	0	3	6	9	13	17	15	13
Gas Fuel Hybrid	0	0	3	6	9	13	17	22	27	33
Gas Fuel ICEV	10	16	20	25	30	36	43	50	43	37
Liquid Fuel Plug-in	0	0	4	8	13	18	24	30	38	46
Liquid Fuel Hybrid	0	3	11	19	29	39	51	65	81	99

Liquid Fuel ICEV	301	372	451	493	552	649	780	940	1053	1076
Total	311	390	490	555	642	770	935	1136	1270	1319

Technology Mix of Mileage for Cars, Region CANADA (Units: billion v-km/y)

Technology	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**	**2050**
Electric Vehicle	0	0	0	2	6	10	9	10	10	14
Hydrogen Fuel Cell	0	0	0	1	4	6	5	4	4	3
Hydrogen Hybrid	0	0	3	6	9	13	17	15	13	11
Gas Fuel Hybrid	0	0	3	6	9	13	17	22	27	33
Gas Fuel ICEV	0	1	4	7	10	14	12	11	9	8
Liquid Fuel Plug-in	0	0	3	7	11	16	21	26	32	39
Liquid Fuel Hybrid	0	3	11	18	27	37	48	61	76	93
Liquid Fuel ICEV	313	329	341	351	351	349	360	374	384	387
Total	314	332	365	398	429	457	490	522	555	588

Technology Mix of Mileage for Cars, Region CHINA (Units: billion v-km/y)

Technology	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**	**2050**
Electric Vehicle	0	0	2	6	12	18	24	32	41	50
Hydrogen Fuel Cell	0	0	2	3	8	14	21	28	36	31
Hydrogen Hybrid	0	0	3	6	10	13	18	22	28	33
Gas Fuel Hybrid	0	0	3	6	10	13	18	22	28	33
Gas Fuel ICEV	1	3	7	10	14	18	23	28	34	30
Liquid Fuel Plug-in	0	0	4	10	15	22	29	37	46	56
Liquid Fuel Hybrid	0	2	11	19	30	41	54	69	86	106
Liquid Fuel ICEV	213	305	457	669	963	1402	1918	2519	3134	3340
Total	213	310	488	730	1061	1542	2105	2759	3433	3680

Technology Mix of Mileage for Cars, Region EEUR (Units: billion v-km/y)

Technology	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**	**2050**
Electric Vehicle	0	0	0	0	1	1	1	2	2	3
Hydrogen Fuel Cell	0	0	0	0	0	0	0	0	0	0
Hydrogen Hybrid	0	0	0	0	0	0	0	0	0	0
Gas Fuel Hybrid	0	0	1	2	4	6	7	9	11	14
Gas Fuel ICEV	0	1	2	3	5	7	9	7	6	6
Liquid Fuel Plug-in	0	0	0	0	1	1	1	2	2	4
Liquid Fuel Hybrid	0	1	3	5	9	12	17	22	28	34
Liquid Fuel ICEV	131	142	155	172	182	195	207	218	227	231
Total	131	144	162	184	201	222	242	260	277	291

Technology Mix of Mileage for Cars, Region FSU (Units: billion v-km/y)

Technology	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**	**2050**
Electric Vehicle	0	0	0	1	3	5	8	11	11	11
Hydrogen Fuel Cell	0	0	0	1	3	5	8	8	7	6
Hydrogen Hybrid	0	0	2	3	5	8	10	13	11	9
Gas Fuel Hybrid	0	0	2	3	5	8	10	13	16	19
Gas Fuel ICEV	0	2	4	6	8	10	13	16	14	12
Liquid Fuel Plug-in	0	0	2	4	7	9	12	16	20	24
Liquid Fuel Hybrid	0	2	6	11	16	22	28	36	45	54
Liquid Fuel ICEV	179	214	250	302	373	462	533	604	684	753
Total	180	218	266	331	420	529	623	716	806	888

Technology Mix of Mileage for Cars, Region INDIA (Units: billion v-km/y)

Technology	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**	**2050**
Electric Vehicle	0	0	1	1	3	5	7	10	13	16
Hydrogen Fuel Cell	0	0	1	1	2	3	5	7	10	10
Hydrogen Hybrid	0	0	1	2	3	5	6	8	10	12
Gas Fuel Hybrid	0	0	1	2	3	5	6	8	10	12
Gas Fuel ICEV	1	2	4	5	7	8	10	12	14	17
Liquid Fuel Plug-in	0	0	2	3	5	8	10	13	16	20
Liquid Fuel Hybrid	0	1	4	7	11	15	20	26	32	39
Liquid Fuel ICEV	111	149	211	293	383	511	710	1034	1511	1964
Total	112	153	224	315	417	560	774	1117	1615	2089

Technology Mix of Mileage for Cars, Region LAM (Units: billion v-km/y)

Technology	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**	**2050**
Electric Vehicle	0	0	1	2	5	8	12	16	21	26
Hydrogen Fuel Cell	0	0	0	1	2	5	8	10	9	7
Hydrogen Hybrid	0	0	2	4	7	10	13	16	20	17
Gas Fuel Hybrid	0	0	2	4	7	10	13	16	20	24
Gas Fuel ICEV	22	25	30	35	41	47	54	62	63	55
Liquid Fuel Plug-in	0	0	3	6	9	13	18	23	28	34
Liquid Fuel Hybrid	0	2	8	15	21	29	38	49	61	74
Liquid Fuel ICEV	211	266	331	417	492	561	666	809	1015	1287
Total	233	293	376	483	583	683	821	1001	1237	1525

Technology Mix of Mileage for Cars, Region MEA (Units: billion v-km/y)										
Technology	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**	**2050**
Electric Vehicle	0	0	1	2	3	4	6	7	9	12
Hydrogen Fuel Cell	0	0	0	0	0	0	0	0	0	0
Hydrogen Hybrid	0	0	0	0	1	4	7	10	8	7
Gas Fuel Hybrid	0	0	2	5	8	11	15	19	24	28
Gas Fuel ICEV	1	4	7	10	13	17	21	26	22	19
Liquid Fuel Plug-in	0	0	3	7	11	16	21	26	33	40
Liquid Fuel Hybrid	0	3	10	17	25	34	45	57	71	86
Liquid Fuel ICEV	271	324	394	483	562	648	731	813	912	1021
Total	273	330	417	524	623	734	845	958	1079	1214

Technology Mix of Mileage for Cars, Region MEXICO (Units: billion v-km/y)										
Technology	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**	**2050**
Electric Vehicle	0	0	0	1	3	5	7	10	10	10
Hydrogen Fuel Cell	0	0	0	1	1	3	5	6	5	4
Hydrogen Hybrid	0	0	2	3	5	7	10	12	11	9
Gas Fuel Hybrid	0	0	2	3	5	7	10	12	15	18
Gas Fuel ICEV	0	0	2	4	5	8	10	12	11	9
Liquid Fuel Plug-in	0	0	2	4	6	9	12	15	19	23
Liquid Fuel Hybrid	0	2	6	10	15	21	27	34	43	52
Liquid Fuel ICEV	172	213	258	287	334	395	478	579	673	714
Total	172	215	272	313	375	455	559	681	786	840

Technology Mix of Mileage for Cars, Region PACIFIC (Units: billion v-km/y)										
Technology	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**	**2050**
Electric Vehicle	0	0	1	3	5	7	10	13	17	21
Hydrogen Fuel Cell	0	0	1	3	5	4	4	3	3	2
Hydrogen Hybrid	0	0	9	18	29	34	29	25	22	19
Gas Fuel Hybrid	0	0	9	18	29	41	54	68	84	102
Gas Fuel ICEV	0	0	9	18	29	41	35	30	26	25
Liquid Fuel Plug-in	0	0	10	22	34	48	45	43	43	54
Liquid Fuel Hybrid	3	14	41	66	95	127	164	206	254	309
Liquid Fuel ICEV	969	1024	1050	1038	989	922	903	876	845	791
Total	972	1038	1131	1187	1215	1225	1245	1266	1294	1321

Technology Mix of Mileage for Cars, Region RUSSIA (Units: billion v-km/y)										
Technology	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**	**2050**
Electric Vehicle	0	0	2	6	10	15	20	26	25	25
Hydrogen Fuel Cell	0	0	1	4	9	13	19	16	14	12
Hydrogen Hybrid	0	0	3	6	10	14	19	23	23	26
Gas Fuel Hybrid	0	0	3	6	10	14	19	23	29	35
Gas Fuel ICEV	0	3	6	9	13	18	23	28	24	21
Liquid Fuel Plug-in	0	0	4	8	12	17	23	29	37	44
Liquid Fuel Hybrid	0	3	12	20	30	40	53	67	83	101
Liquid Fuel ICEV	334	407	457	519	579	648	707	766	839	904
Total	334	412	486	579	673	780	881	980	1074	1168

Technology Mix of Mileage for Cars, Region USA (Units: billion v-km/y)										
Technology	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**	**2050**
Electric Vehicle	0	0	6	14	22	31	42	55	70	88
Hydrogen Fuel Cell	0	0	0	0	0	0	0	0	0	0
Hydrogen Hybrid	0	0	0	0	37	78	78	67	58	58
Gas Fuel Hybrid	0	0	37	78	123	172	227	288	355	429
Gas Fuel ICEV	2	10	48	90	136	187	162	139	120	104
Liquid Fuel Plug-in	0	0	43	91	144	204	270	343	425	516
Liquid Fuel Hybrid	6	32	132	231	344	472	617	783	972	1187
Liquid Fuel ICEV	4097	4312	4427	4525	4549	4511	4622	4697	4738	4726
Total	4105	4354	4694	5028	5355	5656	6018	6373	6739	7108

Technology Mix of Mileage for Cars, Region WEUR (Units: billion v-km/y)										
Technology	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**	**2050**
Electric Vehicle	0	0	4	9	14	21	28	37	47	58
Hydrogen Fuel Cell	0	0	0	0	0	0	0	0	0	0
Hydrogen Hybrid	0	0	0	0	0	0	0	0	0	0
Gas Fuel Hybrid	0	0	25	52	82	115	152	192	237	286
Gas Fuel ICEV	4	19	46	75	108	144	183	227	275	329
Liquid Fuel Plug-in	0	0	4	9	14	21	28	37	47	56
Liquid Fuel Hybrid	1	7	51	112	182	260	350	452	568	700
Liquid Fuel ICEV	2731	2955	3166	3156	3086	2956	2811	2630	2430	2195
Total	2736	2982	3296	3414	3486	3516	3552	3575	3603	3623

Technology Mix for Cars (million)

Technology Mix for Cars (Units: million)

Technology	2005	2010	2015	2020	2025	2030	2035	2040	2045	2050
Electric Vehicle	0	0	1	4	8	12	16	21	25	30
Hydrogen Fuel Cell	0	0	1	2	3	6	8	9	9	8
Hydrogen Hybrid	0	0	2	5	10	15	17	19	19	18
Gas Fuel Hybrid	0	0	7	14	22	31	41	52	64	78
Gas Fuel ICEV	3	7	14	23	32	42	46	52	54	55
Liquid Fuel Plug-in	0	0	6	13	20	28	36	45	55	67
Diesel Type Hybrid	0	0	5	13	21	29	39	50	62	75
Gasoline Type Hybrid	1	5	17	27	40	54	71	90	113	139
Diesel Type ICEV	83	74	75	83	106	153	238	365	531	726
Gasoline Type ICEV	636	725	803	861	903	934	964	981	977	891
Total	723	810	931	1045	1165	1304	1477	1684	1909	2086

Technology Mix for Cars, Region AFRICA (Units: million)

Technology	2005	2010	2015	2020	2025	2030	2035	2040	2045	2050
Electric Vehicle	0	0	0	0	1	1	1	2	2	2
Hydrogen Fuel Cell	0	0	0	0	1	1	1	1	1	1
Hydrogen Hybrid	0	0	0	0	1	1	1	2	1	1
Gas Fuel Hybrid	0	0	0	0	1	1	1	2	2	3
Gas Fuel ICEV	0	0	1	1	1	1	2	2	2	2
Liquid Fuel Plug-in	0	0	0	1	1	1	2	2	3	3
Diesel Type Hybrid	0	0	0	0	1	1	1	2	2	3
Gasoline Type Hybrid	0	0	1	1	1	2	2	3	4	5
Diesel Type ICEV	2	2	2	2	3	5	8	15	29	58
Gasoline Type ICEV	16	21	27	34	41	44	48	51	56	52
Total	18	23	31	41	50	59	68	82	102	129

Technology Mix for Cars, Region ASIA (Units: million)

Technology	2005	2010	2015	2020	2025	2030	2035	2040	2045	2050
Electric Vehicle	0	0	0	1	1	2	2	3	4	4
Hydrogen Fuel Cell	0	0	0	0	0	1	1	2	2	2
Hydrogen Hybrid	0	0	0	1	1	1	2	2	3	2
Gas Fuel Hybrid	0	0	0	1	1	1	2	2	3	3
Gas Fuel ICEV	0	1	1	2	2	3	3	4	5	4
Liquid Fuel Plug-in	0	0	0	1	1	2	3	3	4	5
Diesel Type Hybrid	0	0	0	1	1	1	2	2	3	3
Gasoline Type Hybrid	0	0	1	1	2	3	3	4	5	7
Diesel Type ICEV	0	0	0	1	2	4	9	19	39	78
Gasoline Type ICEV	25	31	39	49	60	76	101	132	153	139
Total	25	32	43	56	72	95	129	174	220	248

Technology Mix for Cars, Region BRAZIL (Units: million)

Technology	2005	2010	2015	2020	2025	2030	2035	2040	2045	2050
Electric Vehicle	0	0	0	0	0	0	0	1	1	1
Hydrogen Fuel Cell	0	0	0	0	0	0	0	0	0	0
Hydrogen Hybrid	0	0	0	0	0	1	1	1	1	1
Gas Fuel Hybrid	0	0	0	0	1	1	1	1	2	2
Gas Fuel ICEV	1	1	1	2	2	2	3	3	3	2
Liquid Fuel Plug-in	0	0	0	1	1	1	2	2	2	3
Diesel Type Hybrid	0	0	0	0	1	1	1	1	2	2
Gasoline Type Hybrid	0	0	1	1	1	2	2	3	3	4
Diesel Type ICEV	1	2	4	8	11	11	13	18	28	38
Gasoline Type ICEV	18	22	25	23	24	30	36	41	38	30
Total	20	25	31	35	40	48	59	71	80	83

Technology Mix for Cars, Region CANADA (Units: million)

Technology	2005	2010	2015	2020	2025	2030	2035	2040	2045	2050
Electric Vehicle	0	0	0	0	0	1	1	1	1	1
Hydrogen Fuel Cell	0	0	0	0	0	0	0	0	0	0
Hydrogen Hybrid	0	0	0	0	1	1	1	1	1	1
Gas Fuel Hybrid	0	0	0	0	1	1	1	1	2	2
Gas Fuel ICEV	0	0	0	0	1	1	1	1	1	0
Liquid Fuel Plug-in	0	0	0	0	1	1	1	2	2	2
Diesel Type Hybrid	0	0	0	0	1	1	1	1	2	2
Gasoline Type Hybrid	0	0	0	1	1	1	2	2	3	4
Diesel Type ICEV	0	1	1	2	2	3	6	10	13	15
Gasoline Type ICEV	18	19	19	19	19	17	15	12	9	8
Total	19	20	22	24	26	27	29	31	33	35

Technology Mix for Cars, Region CHINA (Units: million)

Technology	2005	2010	2015	2020	2025	2030	2035	2040	2045	2050
Electric Vehicle	0	0	0	0	1	1	2	2	3	3

Hydrogen Fuel Cell	0	0	0	0	1	1	1	2	2	2
Hydrogen Hybrid	0	0	0	0	1	1	1	1	2	2
Gas Fuel Hybrid	0	0	0	0	1	1	1	1	2	2
Gas Fuel ICEV	0	0	0	1	1	1	2	2	2	2
Liquid Fuel Plug-in	0	0	0	1	1	1	2	2	3	4
Diesel Type Hybrid	0	0	0	0	1	1	1	1	2	2
Gasoline Type Hybrid	0	0	1	1	1	2	2	3	4	5
Diesel Type ICEV	3	2	4	3	4	5	8	15	27	52
Gasoline Type ICEV	12	18	27	41	60	88	120	153	182	170
Total	14	21	33	49	71	103	140	184	229	245

Technology Mix for Cars, Region EEUR (Units: million)

Technology	2005	2010	2015	2020	2025	2030	2035	2040	2045	2050
Electric Vehicle	0	0	0	0	0	0	0	0	0	0
Hydrogen Fuel Cell	0	0	0	0	0	0	0	0	0	0
Hydrogen Hybrid	0	0	0	0	0	0	0	0	0	0
Gas Fuel Hybrid	0	0	0	0	0	0	1	1	1	1
Gas Fuel ICEV	0	0	0	0	0	1	1	1	1	0
Liquid Fuel Plug-in	0	0	0	0	0	0	0	0	0	0
Diesel Type Hybrid	0	0	0	0	0	0	0	0	1	1
Gasoline Type Hybrid	0	0	0	0	1	1	1	1	2	2
Diesel Type ICEV	0	0	0	1	1	2	3	7	9	12
Gasoline Type ICEV	10	11	12	14	14	14	14	11	9	7
Total	11	12	13	15	16	18	20	21	23	24

Technology Mix for Cars, Region FSU (Units: million)

Technology	2005	2010	2015	2020	2025	2030	2035	2040	2045	2050
Electric Vehicle	0	0	0	0	0	0	1	1	1	1
Hydrogen Fuel Cell	0	0	0	0	0	0	1	1	0	0
Hydrogen Hybrid	0	0	0	0	0	1	1	1	1	1
Gas Fuel Hybrid	0	0	0	0	0	1	1	1	1	1
Gas Fuel ICEV	0	0	0	0	1	1	1	1	1	1
Liquid Fuel Plug-in	0	0	0	0	0	1	1	1	1	2
Diesel Type Hybrid	0	0	0	0	0	1	1	1	1	1
Gasoline Type Hybrid	0	0	0	1	1	1	1	2	2	3
Diesel Type ICEV	1	0	1	1	1	2	4	8	16	29
Gasoline Type ICEV	13	16	18	22	27	33	36	38	36	28
Total	14	17	20	25	32	40	47	54	61	67

Technology Mix for Cars, Region INDIA (Units: million)

Technology	2005	2010	2015	2020	2025	2030	2035	2040	2045	2050
Electric Vehicle	0	0	0	0	0	0	0	1	1	1
Hydrogen Fuel Cell	0	0	0	0	0	0	0	0	1	1
Hydrogen Hybrid	0	0	0	0	0	0	0	1	1	1
Gas Fuel Hybrid	0	0	0	0	0	0	0	1	1	1
Gas Fuel ICEV	0	0	0	0	0	1	1	1	1	1
Liquid Fuel Plug-in	0	0	0	0	0	1	1	1	1	1
Diesel Type Hybrid	0	0	0	0	0	0	0	1	1	1
Gasoline Type Hybrid	0	0	0	0	1	1	1	1	1	2
Diesel Type ICEV	2	2	1	2	2	2	4	9	17	25
Gasoline Type ICEV	6	8	13	18	24	32	43	60	84	106
Total	7	10	15	21	28	37	52	74	108	139

Technology Mix for Cars, Region LAM (Units: million)

Technology	2005	2010	2015	2020	2025	2030	2035	2040	2045	2050
Electric Vehicle	0	0	0	0	0	1	1	1	1	2
Hydrogen Fuel Cell	0	0	0	0	0	0	1	1	1	0
Hydrogen Hybrid	0	0	0	0	0	1	1	1	1	1
Gas Fuel Hybrid	0	0	0	0	0	1	1	1	1	2
Gas Fuel ICEV	1	2	2	2	3	3	3	4	4	3
Liquid Fuel Plug-in	0	0	0	0	1	1	1	1	2	2
Diesel Type Hybrid	0	0	0	0	0	1	1	1	1	2
Gasoline Type Hybrid	0	0	0	1	1	1	2	2	3	3
Diesel Type ICEV	0	0	0	1	1	2	4	9	17	35
Gasoline Type ICEV	13	16	20	26	30	33	38	42	47	46
Total	15	18	24	30	37	43	52	63	78	96

Technology Mix for Cars, Region MEA (Units: million)

Technology	2005	2010	2015	2020	2025	2030	2035	2040	2045	2050
Electric Vehicle	0	0	0	0	0	0	0	0	1	1
Hydrogen Fuel Cell	0	0	0	0	0	0	0	0	0	0
Hydrogen Hybrid	0	0	0	0	0	0	0	1	0	0
Gas Fuel Hybrid	0	0	0	0	0	1	1	1	1	2
Gas Fuel ICEV	0	0	0	1	1	1	1	1	1	1
Liquid Fuel Plug-in	0	0	0	0	1	1	1	2	2	2

Diesel Type Hybrid	0	0	0	0	0	1	1	1	1	2
Gasoline Type Hybrid	0	0	0	1	1	1	2	2	3	3
Diesel Type ICEV	1	1	1	1	2	3	5	9	18	31
Gasoline Type ICEV	14	18	21	26	30	34	37	37	33	27
Total	15	19	24	30	35	42	48	54	61	69

Technology Mix for Cars, Region MEXICO (Units: million)

Technology	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**	**2050**
Electric Vehicle	0	0	0	0	0	0	1	1	1	1
Hydrogen Fuel Cell	0	0	0	0	0	0	0	0	0	0
Hydrogen Hybrid	0	0	0	0	0	1	1	1	1	1
Gas Fuel Hybrid	0	0	0	0	0	1	1	1	1	2
Gas Fuel ICEV	0	0	0	0	0	1	1	1	1	1
Liquid Fuel Plug-in	0	0	0	0	1	1	1	1	2	2
Diesel Type Hybrid	0	0	0	0	0	1	1	1	1	2
Gasoline Type Hybrid	0	0	0	1	1	1	2	2	2	3
Diesel Type ICEV	0	0	0	1	1	2	5	9	18	31
Gasoline Type ICEV	15	19	23	25	28	33	38	42	41	32
Total	15	19	24	28	33	40	49	60	70	74

Technology Mix for Cars, Region PACIFIC (Units: million)

Technology	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**	**2050**
Electric Vehicle	0	0	0	0	0	0	1	1	1	1
Hydrogen Fuel Cell	0	0	0	0	0	0	0	0	0	0
Hydrogen Hybrid	0	0	1	2	2	3	2	2	2	2
Gas Fuel Hybrid	0	0	1	2	2	3	4	6	7	8
Gas Fuel ICEV	0	0	1	2	2	3	3	3	2	2
Liquid Fuel Plug-in	0	0	1	2	3	4	4	3	3	4
Diesel Type Hybrid	0	0	1	2	2	3	4	6	7	8
Gasoline Type Hybrid	0	1	3	4	5	7	9	11	14	17
Diesel Type ICEV	10	9	8	9	11	16	24	30	37	40
Gasoline Type ICEV	69	75	77	76	70	59	50	41	32	25
Total	79	85	92	97	99	100	102	103	106	108

Technology Mix for Cars, Region RUSSIA (Units: million)

Technology	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**	**2050**
Electric Vehicle	0	0	0	0	1	1	2	2	2	2
Hydrogen Fuel Cell	0	0	0	0	1	1	1	1	1	1
Hydrogen Hybrid	0	0	0	0	1	1	1	2	2	2
Gas Fuel Hybrid	0	0	0	0	1	1	1	2	2	3
Gas Fuel ICEV	0	0	0	1	1	1	2	2	2	2
Liquid Fuel Plug-in	0	0	0	1	1	1	2	2	3	3
Diesel Type Hybrid	0	0	0	0	1	1	1	2	2	3
Gasoline Type Hybrid	0	0	1	1	1	2	3	3	4	5
Diesel Type ICEV	0	0	0	1	2	4	7	15	30	42
Gasoline Type ICEV	25	31	34	38	42	45	46	43	33	26
Total	25	31	37	44	51	59	67	74	82	89

Technology Mix for Cars, Region USA (Units: million)

Technology	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**	**2050**
Electric Vehicle	0	0	0	1	1	2	3	4	5	6
Hydrogen Fuel Cell	0	0	0	0	0	0	0	0	0	0
Hydrogen Hybrid	0	0	0	0	2	4	4	4	3	3
Gas Fuel Hybrid	0	0	2	4	6	9	12	15	19	23
Gas Fuel ICEV	0	1	3	5	7	10	9	7	6	5
Liquid Fuel Plug-in	0	0	2	5	8	11	15	19	23	28
Diesel Type Hybrid	0	0	2	4	6	9	12	15	19	23
Gasoline Type Hybrid	0	2	5	8	12	16	21	27	33	41
Diesel Type ICEV	1	1	3	7	15	30	62	110	142	163
Gasoline Type ICEV	221	232	236	238	231	214	188	144	114	92
Total	222	235	254	272	289	306	325	344	364	384

Technology Mix for Cars, Region WEUR (Units: million)

Technology	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**	**2050**
Electric Vehicle	0	0	0	1	1	1	2	2	3	4
Hydrogen Fuel Cell	0	0	0	0	0	0	0	0	0	0
Hydrogen Hybrid	0	0	0	0	0	0	0	0	0	0
Gas Fuel Hybrid	0	0	2	4	7	10	13	16	20	24
Gas Fuel ICEV	0	2	4	6	9	12	15	19	23	27
Liquid Fuel Plug-in	0	0	0	1	1	1	2	2	3	4
Diesel Type Hybrid	0	0	1	3	5	8	11	14	18	21
Gasoline Type Hybrid	0	1	3	6	9	13	18	23	29	36
Diesel Type ICEV	62	54	49	46	49	61	75	82	88	76
Gasoline Type ICEV	161	187	210	212	203	180	155	133	111	104
Total	223	244	269	279	285	287	290	292	294	296

CO2 Emission

CO2-Emission from Cars (Units: GtCO2/y)										
Region	2005	2010	2015	2020	2025	2030	2035	2040	2045	2050
USA	1.1	1.2	1.2	1.1	1.1	1.0	0.9	0.8	0.7	0.7
RUSSIA	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
PACIFIC	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.1
MEXICO	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
MEA	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.2
LAM	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2
INDIA	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.2	0.2	0.3
FSU	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
WEUR	0.5	0.5	0.5	0.5	0.4	0.4	0.4	0.4	0.4	0.4
EEUR	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CHINA	0.1	0.1	0.1	0.2	0.2	0.3	0.4	0.5	0.6	0.6
CANADA	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
BRAZIL	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2
ASIA	0.1	0.1	0.2	0.2	0.2	0.3	0.4	0.5	0.5	0.6
AFRICA	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.2
Total	2.6	2.8	3.0	3.1	3.2	3.3	3.4	3.6	3.7	3.8

CO2-Emission (Units: GtCO2/y)										
Region	2005	2010	2015	2020	2025	2030	2035	2040	2045	2050
USA	1.9	1.9	1.9	1.9	1.9	1.8	1.7	1.7	1.7	1.7
RUSSIA	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.4	0.4	0.4
PACIFIC	0.5	0.5	0.5	0.5	0.5	0.4	0.4	0.4	0.4	0.4
MEXICO	0.1	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.3	0.4
MEA	0.4	0.4	0.4	0.5	0.5	0.6	0.7	0.8	0.8	0.9
LAM	0.3	0.3	0.4	0.4	0.5	0.5	0.6	0.7	0.7	0.8
INDIA	0.1	0.2	0.2	0.2	0.3	0.3	0.4	0.5	0.6	0.8
FSU	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.4	0.4	0.4
WEUR	1.3	1.2	1.3	1.3	1.3	1.2	1.2	1.3	1.3	1.3
EEUR	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
CHINA	0.5	0.6	0.7	0.9	1.1	1.3	1.4	1.6	1.8	1.9
CANADA	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.2
BRAZIL	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.4	0.4	0.4
ASIA	0.5	0.5	0.7	0.8	0.9	1.1	1.2	1.4	1.5	1.6
AFRICA	0.2	0.3	0.3	0.4	0.4	0.5	0.5	0.6	0.8	0.9
Total	6.5	6.8	7.4	7.9	8.6	9.2	9.8	10.6	11.5	12.2

2-Results for Tollway Scenario

Fuel Demand

Fuel for Cars (EJ/Y)

Fuels for Cars (Units: EJ/y)										
Fuel	2005	2010	2015	2020	2025	2030	2035	2040	2045	2050
Electricity	0.0	0.0	0.1	0.3	0.6	1.0	1.6	2.5	3.6	4.6
Hydrogen	0.0	0.0	0.1	0.2	0.4	0.6	0.8	1.0	1.2	1.5
Bio-Syngas	0.0	0.0	0.3	0.7	0.9	0.7	0.5	0.4	0.2	0.1
CNG	0.1	0.3	0.5	0.7	1.2	1.8	2.5	3.0	3.1	3.1
Biofuel(Diesel)	0.0	0.0	0.1	0.3	0.2	0.1	0.1	0.1	0.2	0.3
Diesel	2.8	2.6	2.7	2.8	3.5	4.0	4.4	4.8	5.1	5.3
Methanol	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bio-Methanol	0.0	0.1	0.4	0.7	1.1	1.4	1.5	1.5	1.6	1.3
Bio-Ethanol	0.6	1.5	2.3	2.8	3.5	3.9	4.4	5.1	6.0	7.2
Gasoline	34.9	38.0	38.7	38.2	35.2	30.4	25.7	21.2	17.1	14.1
Total	38.5	42.6	45.2	46.8	46.5	43.8	41.5	39.5	38.1	37.5

Fuels for Cars, Region AFRICA (Units: EJ/y)										
Fuel	2005	2010	2015	2020	2025	2030	2035	2040	2045	2050
Electricity	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1
Hydrogen	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0
Bio-Syngas	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CNG	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.2	0.2	0.2
Biofuel(Diesel)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Diesel	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.4	0.4
Bio-Methanol	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1
Bio-Ethanol	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.2	0.2
Gasoline	0.9	1.2	1.4	1.7	1.9	1.9	1.8	1.6	1.3	1.2
Total	1.0	1.3	1.6	1.9	2.3	2.4	2.4	2.4	2.3	2.3

Fuels for Cars, Region ASIA (Units: EJ/y)										
Fuel	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**	**2050**
Electricity	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.2	0.3
Hydrogen	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1
Bio-Syngas	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CNG	0.0	0.0	0.1	0.1	0.1	0.2	0.3	0.4	0.5	0.4
Biofuel(Diesel)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Diesel	0.0	0.0	0.0	0.0	0.1	0.1	0.2	0.3	0.6	0.9
Bio-Methanol	0.0	0.0	0.0	0.1	0.1	0.2	0.3	0.3	0.2	0.1
Bio-Ethanol	0.0	0.0	0.0	0.1	0.1	0.2	0.2	0.2	0.3	0.5
Gasoline	1.5	1.9	2.1	2.4	2.5	2.5	2.6	2.6	2.4	2.1
Total	1.5	1.9	2.3	2.8	3.1	3.4	3.7	4.1	4.3	4.4

Fuels for Cars, Region BRAZIL (Units: EJ/y)										
Fuel	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**	**2050**
Electricity	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1
Hydrogen	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Bio-Syngas	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CNG	0.0	0.0	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.2
Biofuel(Diesel)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Diesel	0.0	0.1	0.1	0.2	0.2	0.2	0.2	0.3	0.3	0.2
Bio-Methanol	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Bio-Ethanol	0.2	0.4	0.3	0.3	0.3	0.3	0.3	0.3	0.4	0.6
Gasoline	0.9	0.9	1.2	1.2	1.2	1.2	1.1	0.8	0.5	0.3
Total	1.2	1.5	1.7	1.8	1.8	1.9	1.9	1.8	1.7	1.6

Fuels for Cars, Region CANADA (Units: EJ/y)										
Fuel	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**	**2050**
Electricity	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1
Hydrogen	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bio-Syngas	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CNG	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.0
Biofuel(Diesel)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Diesel	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Bio-Methanol	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bio-Ethanol	0.0	0.0	0.1	0.1	0.1	0.0	0.1	0.1	0.1	0.2
Gasoline	1.2	1.2	1.1	1.1	1.0	0.8	0.6	0.4	0.2	0.1
Total	1.2	1.3	1.3	1.3	1.2	1.0	0.9	0.8	0.7	0.6

Fuels for Cars, Region CHINA (Units: EJ/y)										
Fuel	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**	**2050**
Electricity	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.2	0.2
Hydrogen	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1
Bio-Syngas	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CNG	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.2	0.2	0.3
Biofuel(Diesel)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Diesel	0.1	0.2	0.4	0.5	0.5	0.5	0.5	0.5	0.6	0.8
Methanol	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bio-Methanol	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Bio-Ethanol	0.0	0.0	0.0	0.0	0.1	0.1	0.2	0.2	0.3	0.4
Gasoline	0.6	0.9	1.1	1.4	1.9	2.3	2.9	3.2	3.4	3.0
Total	0.8	1.2	1.6	2.1	2.5	3.1	3.7	4.3	4.8	5.0

Fuels for Cars, Region EEUR (Units: EJ/y)										
Fuel	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**	**2050**
Electricity	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Hydrogen	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bio-Syngas	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CNG	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Biofuel(Diesel)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Diesel	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bio-Methanol	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bio-Ethanol	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Gasoline	0.4	0.4	0.4	0.4	0.4	0.3	0.2	0.2	0.1	0.1
Total	0.4	0.4	0.5	0.5	0.5	0.4	0.4	0.3	0.3	0.3

Fuels for Cars, Region FSU (Units: EJ/y)										
Fuel	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**	**2050**
Electricity	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1
Hydrogen	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bio-Syngas	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CNG	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1
Biofuel(Diesel)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Diesel	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1

Bio-Methanol	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0
Bio-Ethanol	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.2	0.2
Gasoline	0.6	0.7	0.8	0.8	0.8	0.8	0.7	0.6	0.4	0.3
Total	0.6	0.8	0.8	0.9	1.0	1.0	1.1	1.0	0.9	0.9

Fuels for Cars, Region INDIA (Units: EJ/y)

Fuel	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**	**2050**
Electricity	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1
Hydrogen	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bio-Syngas	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CNG	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1
Biofuel(Diesel)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.2
Diesel	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0
Bio-Methanol	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bio-Ethanol	0.0	0.0	0.1	0.2	0.2	0.3	0.3	0.4	0.6	0.7
Gasoline	0.3	0.5	0.6	0.7	0.9	1.1	1.3	1.5	1.8	2.2
Total	0.4	0.6	0.8	1.0	1.2	1.5	1.8	2.2	2.8	3.4

Fuels for Cars, Region LAM (Units: EJ/y)

Fuel	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**	**2050**
Electricity	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1
Hydrogen	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bio-Syngas	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CNG	0.1	0.1	0.1	0.1	0.2	0.2	0.3	0.4	0.4	0.3
Biofuel(Diesel)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Diesel	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.2	0.3	0.3
Bio-Methanol	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.0
Bio-Ethanol	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.2	0.2	0.3
Gasoline	0.8	1.0	1.1	1.2	1.3	1.2	1.1	0.8	0.7	0.6
Total	0.9	1.1	1.3	1.5	1.8	1.8	1.8	1.8	1.7	1.7

Fuels for Cars, Region MEA (Units: EJ/y)

Fuel	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**	**2050**
Electricity	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1
Hydrogen	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bio-Syngas	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CNG	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1
Biofuel(Diesel)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Diesel	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.3	0.4
Bio-Methanol	0.0	0.0	0.0	0.0	0.1	0.1	0.2	0.2	0.1	0.1
Bio-Ethanol	0.0	0.0	0.0	0.0	0.1	0.1	0.2	0.2	0.2	0.3
Gasoline	1.0	1.2	1.4	1.6	1.7	1.7	1.5	1.3	0.9	0.7
Total	1.1	1.3	1.5	1.8	1.9	2.1	2.2	2.1	1.9	1.8

Fuels for Cars, Region MEXICO (Units: EJ/y)

Fuel	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**	**2050**
Electricity	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1
Hydrogen	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bio-Syngas	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CNG	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1
Biofuel(Diesel)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Diesel	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.2	0.2
Bio-Methanol	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bio-Ethanol	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.2
Gasoline	0.7	0.8	0.9	1.0	1.0	1.0	0.9	0.8	0.6	0.5
Total	0.7	0.8	1.0	1.0	1.1	1.2	1.2	1.2	1.1	1.0

Fuels for Cars, Region PACIFIC (Units: EJ/y)

Fuel	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**	**2050**
Electricity	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.2	0.3	0.3
Hydrogen	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1
Bio-Syngas	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CNG	0.0	0.0	0.0	0.1	0.1	0.1	0.2	0.1	0.1	0.1
Biofuel(Diesel)	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0
Diesel	0.4	0.3	0.3	0.2	0.3	0.3	0.3	0.2	0.2	0.2
Bio-Methanol	0.0	0.0	0.1	0.2	0.2	0.1	0.1	0.0	0.1	0.1
Bio-Ethanol	0.0	0.0	0.1	0.2	0.2	0.1	0.2	0.2	0.3	0.3
Gasoline	3.0	3.2	3.0	2.6	2.1	1.7	1.3	0.9	0.5	0.3
Total	3.4	3.6	3.6	3.4	3.0	2.5	2.1	1.8	1.6	1.4

Fuels for Cars, Region RUSSIA (Units: EJ/y)

Fuel	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**	**2050**
Electricity	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1
Hydrogen	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bio-Syngas	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

CNG	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1
Biofuel(Diesel)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Diesel	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.2	0.2	0.1
Bio-Methanol	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bio-Ethanol	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.2	0.2
Gasoline	1.2	1.4	1.5	1.5	1.4	1.3	1.1	0.8	0.6	0.5
Total	1.2	1.4	1.5	1.6	1.6	1.6	1.5	1.3	1.2	1.1

Fuels for Cars, Region USA (Units: EJ/y)

Fuel	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**	**2050**
Electricity	0.0	0.0	0.0	0.1	0.2	0.4	0.6	0.9	1.4	1.8
Hydrogen	0.0	0.0	0.0	0.1	0.2	0.2	0.3	0.3	0.4	0.5
Bio-Syngas	0.0	0.0	0.2	0.4	0.6	0.5	0.4	0.3	0.1	0.1
CNG	0.0	0.0	0.0	0.0	0.0	0.2	0.3	0.5	0.5	0.5
Biofuel(Diesel)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Diesel	0.1	0.1	0.2	0.4	0.6	1.0	1.2	1.1	1.0	0.8
Bio-Methanol	0.0	0.0	0.0	0.1	0.2	0.2	0.3	0.4	0.5	0.4
Bio-Ethanol	0.3	0.9	1.3	1.4	1.6	1.7	1.8	1.8	1.8	1.9
Gasoline	16.4	16.6	15.9	14.7	12.5	9.2	6.3	4.2	2.8	1.9
Total	16.8	17.6	17.7	17.2	15.9	13.4	11.1	9.6	8.5	7.8

Fuels for Cars, Region WEUR (Units: EJ/y)

Fuel	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**	**2050**
Electricity	0.0	0.0	0.0	0.1	0.1	0.2	0.4	0.6	0.8	1.0
Hydrogen	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.2	0.3
Bio-Syngas	0.0	0.0	0.1	0.2	0.2	0.2	0.1	0.1	0.0	0.0
CNG	0.0	0.0	0.1	0.1	0.2	0.3	0.5	0.5	0.4	0.4
Biofuel(Diesel)	0.0	0.0	0.1	0.2	0.1	0.1	0.0	0.0	0.0	0.0
Diesel	1.9	1.6	1.3	1.1	1.3	1.3	1.2	1.0	0.9	0.8
Bio-Methanol	0.0	0.0	0.1	0.2	0.3	0.4	0.4	0.3	0.2	0.2
Bio-Ethanol	0.0	0.1	0.2	0.3	0.5	0.6	0.7	0.9	1.1	1.2
Gasoline	5.4	6.2	6.3	5.9	4.8	3.4	2.4	1.6	0.9	0.4
Total	7.3	7.9	8.2	8.1	7.6	6.6	5.8	5.0	4.5	4.2

Fuel in Other Surface Transport and Aviation (EJ/y)

Fuel in Other Surface Transport and Aviation (Units: EJ/y)

Fuel	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**	**2050**
Other (Coal)	0.6	0.8	1.0	1.1	1.3	0.6	0.2	0.1	0.0	0.0
Gasoline	0.0	0.4	0.1	0.0	0.0	0.0	0.0	0.2	0.4	0.3
Diesel	39.4	39.3	40.8	42.0	43.8	46.5	49.2	51.5	54.0	56.0
Bio-Methanol	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bio-Ethanol	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bio-Syngas	0.0	0.0	0.1	1.0	0.2	0.1	0.0	0.0	0.0	0.0
CNG	0.3	0.4	0.2	0.2	0.4	0.5	0.6	0.5	0.4	0.3
Biofuel(Diesel)	0.1	0.5	1.0	1.3	1.2	0.8	0.8	0.8	0.6	0.8
Electricity	0.3	0.4	0.6	1.0	1.6	2.1	2.6	3.3	4.0	4.8
Hydrogen	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bio-FT-Jetfuel	0.0	0.2	0.3	0.3	0.3	0.2	0.2	0.1	0.1	0.2
Jetfuel	10.2	10.5	11.6	12.8	14.3	15.9	17.7	19.6	21.7	23.7
Total	50.9	52.4	55.9	59.9	63.1	66.7	71.4	76.1	81.3	86.2

Fuel in Other Surface Transport and Aviation, Region AFRICA (Units: EJ/y)

Fuel	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**	**2050**
Other (Coal)	0.0	0.0	0.1	0.1	0.1	0.2	0.0	0.0	0.0	0.0
Diesel	1.6	1.6	1.6	1.7	1.9	2.1	2.6	3.0	3.4	3.8
Bio-Methanol	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bio-Ethanol	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bio-Syngas	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0
CNG	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Biofuel(Diesel)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Electricity	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.2	0.2	0.3
Hydrogen	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bio-FT-Jetfuel	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Jetfuel	0.3	0.4	0.5	0.6	0.7	0.9	1.1	1.5	2.0	2.5
Total	2.0	2.1	2.3	2.5	2.9	3.4	3.9	4.7	5.7	6.7

Fuel in Other Surface Transport and Aviation, Region ASIA (Units: EJ/y)

Fuel	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**	**2050**
Other (Coal)	0.0	0.0	0.1	0.1	0.1	0.2	0.0	0.0	0.0	0.0
Diesel	4.2	4.1	4.5	4.9	5.4	5.8	6.2	6.5	6.7	6.8
Bio-Methanol	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bio-Ethanol	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Bio-Syngas	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CNG	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Biofuel(Diesel)	0.0	0.0	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0
Electricity	0.0	0.0	0.0	0.0	0.1	0.1	0.2	0.3	0.4	0.5
Hydrogen	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bio-FT-Jetfuel	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Jetfuel	0.7	0.9	1.1	1.4	1.7	2.0	2.2	2.5	2.8	3.0
Total	4.9	5.1	5.8	6.6	7.4	8.1	8.7	9.3	9.9	10.4

Fuel in Other Surface Transport and Aviation, Region BRAZIL (Units: EJ/y)

Fuel	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**	**2050**
Other (Coal)	0.0	0.0	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0
Diesel	1.0	1.0	1.0	1.1	1.1	1.3	1.4	1.5	1.6	1.7
Bio-Methanol	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bio-Ethanol	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bio-Syngas	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CNG	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Biofuel(Diesel)	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1
Electricity	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.2
Hydrogen	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bio-FT-Jetfuel	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Jetfuel	0.2	0.2	0.2	0.2	0.3	0.3	0.4	0.5	0.5	0.6
Total	1.2	1.3	1.4	1.5	1.7	1.8	2.0	2.2	2.3	2.5

Fuel in Other Surface Transport and Aviation, Region CANADA (Units: EJ/y)

Fuel	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**	**2050**
Other (Coal)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Diesel	0.7	0.7	0.7	0.7	0.6	0.6	0.6	0.7	0.7	0.7
Bio-Methanol	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bio-Ethanol	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bio-Syngas	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CNG	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Biofuel(Diesel)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Electricity	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1
Hydrogen	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bio-FT-Jetfuel	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Jetfuel	0.2	0.2	0.3	0.3	0.3	0.3	0.3	0.3	0.4	0.4
Total	1.0	0.9	1.0	1.0	1.0	1.0	1.0	1.1	1.1	1.1

Fuel in Other Surface Transport and Aviation, Region CHINA (Units: EJ/y)

Fuel	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**	**2050**
Other (Coal)	0.6	0.6	0.6	0.7	0.7	0.2	0.1	0.0	0.0	0.0
Diesel	3.6	4.5	5.2	5.8	6.3	6.9	7.3	7.6	7.9	8.1
Bio-Methanol	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bio-Ethanol	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Biofuel(Diesel)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Electricity	0.0	0.0	0.1	0.1	0.2	0.3	0.3	0.4	0.6	0.7
Hydrogen	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bio-FT-Jetfuel	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Jetfuel	0.6	0.7	1.0	1.2	1.5	1.7	2.0	2.2	2.4	2.6
Total	4.8	5.9	6.9	7.8	8.7	9.1	9.7	10.3	10.9	11.4

Fuel in Other Surface Transport and Aviation, Region EEUR (Units: EJ/y)

Fuel	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**	**2050**
Other (Coal)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Diesel	0.3	0.3	0.3	0.3	0.3	0.3	0.4	0.4	0.4	0.4
Bio-Methanol	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bio-Ethanol	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bio-Syngas	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CNG	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Biofuel(Diesel)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Electricity	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hydrogen	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bio-FT-Jetfuel	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Jetfuel	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Total	0.3	0.4	0.4	0.4	0.4	0.4	0.5	0.5	0.5	0.6

Fuel in Other Surface Transport and Aviation, Region FSU (Units: EJ/y)

Fuel	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**	**2050**
Other (Coal)	0.0	0.0	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0
Diesel	1.4	1.6	1.7	1.7	1.9	2.0	2.2	2.3	2.5	2.7
Bio-Methanol	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bio-Ethanol	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bio-Syngas	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CNG	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Biofuel(Diesel)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Electricity	0.0	0.0	0.0	0.1	0.1	0.1	0.2	0.2	0.2	0.2
Hydrogen	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bio-FT-Jetfuel	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Jetfuel	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.3	0.3
Total	1.5	1.8	1.9	2.1	2.3	2.4	2.6	2.8	3.0	3.3

Fuel in Other Surface Transport and Aviation, Region INDIA (Units: EJ/y)

Fuel	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**	**2050**
Other (Coal)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Gasoline	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.4	0.3
Diesel	0.9	1.1	0.9	1.0	1.1	1.2	1.3	1.4	1.6	1.9
Bio-Methanol	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bio-Ethanol	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bio-Syngas	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CNG	0.0	0.1	0.1	0.2	0.2	0.3	0.4	0.3	0.2	0.2
Biofuel(Diesel)	0.0	0.0	0.2	0.3	0.3	0.3	0.3	0.4	0.3	0.2
Electricity	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.2	0.2
Hydrogen	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bio-FT-Jetfuel	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Jetfuel	0.1	0.2	0.3	0.3	0.4	0.5	0.6	0.8	1.0	1.1
Total	1.1	1.4	1.6	1.8	2.1	2.4	2.8	3.2	3.6	4.0

Fuel in Other Surface Transport and Aviation, Region LAM (Units: EJ/y)

Fuel	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**	**2050**
Other (Coal)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Diesel	2.9	3.2	3.5	3.7	4.0	4.4	4.7	4.9	5.1	5.2
Bio-Methanol	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bio-Ethanol	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bio-Syngas	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CNG	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Biofuel(Diesel)	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0
Electricity	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.2	0.4	0.5
Hydrogen	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bio-FT-Jetfuel	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Jetfuel	0.2	0.2	0.3	0.4	0.4	0.5	0.6	0.6	0.7	0.8
Total	3.3	3.6	3.9	4.2	4.6	5.0	5.4	5.8	6.2	6.6

Fuel in Other Surface Transport and Aviation, Region MEA (Units: EJ/y)

Fuel	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**	**2050**
Other (Coal)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Gasoline	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Diesel	3.5	3.8	3.9	4.0	4.3	4.6	5.1	5.6	6.0	6.2
Bio-Methanol	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bio-Ethanol	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bio-Syngas	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0
CNG	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Biofuel(Diesel)	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0
Electricity	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.2	0.3	0.5
Hydrogen	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bio-FT-Jetfuel	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Jetfuel	0.5	0.5	0.6	0.7	0.8	0.9	1.1	1.3	1.5	1.8
Total	3.9	4.4	4.6	4.9	5.2	5.7	6.3	7.0	7.8	8.5

Fuel in Other Surface Transport and Aviation, Region MEXICO (Units: EJ/y)

Fuel	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**	**2050**
Other (Coal)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Diesel	1.2	1.3	1.3	1.4	1.5	1.6	1.8	1.9	2.0	2.0
Bio-Methanol	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bio-Ethanol	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Biofuel(Diesel)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Electricity	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.2
Hydrogen	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bio-FT-Jetfuel	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Jetfuel	0.1	0.1	0.2	0.2	0.2	0.3	0.3	0.4	0.4	0.4
Total	1.3	1.4	1.5	1.6	1.8	1.9	2.2	2.3	2.5	2.7

Fuel in Other Surface Transport and Aviation, Region PACIFIC (Units: EJ/y)

Fuel	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**	**2050**
Other (Coal)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Gasoline	0.0	0.4	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Diesel	3.0	2.3	2.4	2.4	2.3	2.2	2.2	2.3	2.3	2.3
Bio-Methanol	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bio-Ethanol	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bio-Syngas	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

CNG	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0
Biofuel(Diesel)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Electricity	0.0	0.0	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.2
Hydrogen	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bio-FT-Jetfuel	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Jetfuel	0.9	0.8	0.9	0.9	0.9	0.9	0.9	0.9	1.0	1.0
Total	3.9	3.6	3.5	3.4	3.4	3.4	3.4	3.5	3.5	3.5

Fuel in Other Surface Transport and Aviation, Region RUSSIA (Units: EJ/y)

Fuel	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**	**2050**
Other (Coal)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Diesel	0.6	0.6	0.9	0.8	0.8	0.8	0.9	0.9	1.0	1.1
Bio-Methanol	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bio-Ethanol	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bio-Syngas	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CNG	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Biofuel(Diesel)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Electricity	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Hydrogen	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bio-FT-Jetfuel	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Jetfuel	0.4	0.5	0.6	0.6	0.7	0.8	1.0	1.1	1.3	1.4
Total	1.1	1.2	1.6	1.6	1.6	1.7	1.9	2.1	2.4	2.6

Fuel in Other Surface Transport and Aviation, Region USA (Units: EJ/y)

Fuel	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**	**2050**
Other (Coal)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Diesel	6.9	6.3	6.3	6.2	6.1	6.1	6.1	5.9	6.0	6.1
Bio-Methanol	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bio-Ethanol	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bio-Syngas	0.0	0.0	0.0	0.6	0.0	0.0	0.0	0.0	0.0	0.0
CNG	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Biofuel(Diesel)	0.0	0.0	0.1	0.1	0.2	0.2	0.2	0.1	0.2	0.3
Electricity	0.0	0.0	0.0	0.1	0.1	0.2	0.3	0.5	0.5	0.5
Hydrogen	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bio-FT-Jetfuel	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.0	0.1	0.1
Jetfuel	3.5	3.4	3.4	3.5	3.7	3.8	4.0	4.2	4.3	4.4
Total	10.4	9.7	9.9	10.7	10.2	10.4	10.6	10.8	11.1	11.4

Fuel in Other Surface Transport and Aviation, Region WEUR (Units: EJ/y)

Fuel	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**	**2050**
Other (Coal)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Diesel	7.7	6.8	6.5	6.2	6.1	6.4	6.5	6.7	7.0	7.1
Bio-Methanol	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bio-Ethanol	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bio-Syngas	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CNG	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Biofuel(Diesel)	0.1	0.3	0.5	0.5	0.4	0.2	0.2	0.1	0.0	0.1
Electricity	0.1	0.1	0.2	0.3	0.5	0.6	0.6	0.6	0.6	0.6
Hydrogen	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bio-FT-Jetfuel	0.0	0.1	0.2	0.3	0.2	0.1	0.1	0.0	0.0	0.0
Jetfuel	2.2	2.2	2.3	2.4	2.6	2.8	2.9	3.0	3.1	3.2
Total	10.1	9.6	9.7	9.8	9.8	10.0	10.3	10.6	10.8	11.0

Fuels in All Transport (EJ/y)

Fuels in All Transport (Units: EJ/y)

Fuel	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**	**2050**
Other (Coal)	0.6	0.8	1.0	1.1	1.3	0.6	0.2	0.1	0.0	0.0
Jetfuels	10.2	10.5	11.6	12.8	14.3	15.9	17.7	19.6	21.7	23.7
Bio-Jetfuels	0.0	0.2	0.3	0.3	0.3	0.2	0.2	0.1	0.1	0.2
Gasoline	34.9	38.4	38.8	38.2	35.2	30.4	25.7	21.4	17.5	14.4
Diesel	42.2	41.9	43.5	44.8	47.3	50.5	53.6	56.3	59.1	61.3
Methanol	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bio-Methanol	0.0	0.1	0.4	0.8	1.1	1.4	1.5	1.6	1.6	1.3
Bio-Ethanol	0.6	1.5	2.4	2.8	3.5	3.9	4.4	5.1	6.0	7.2
Bio-Syngas	0.0	0.0	0.5	1.6	1.1	0.8	0.5	0.4	0.2	0.1
CNG	0.4	0.7	0.7	0.9	1.5	2.3	3.2	3.6	3.6	3.4
Biofuel(Diesel)	0.1	0.5	1.1	1.7	1.4	0.9	0.9	0.8	0.8	1.0
Electricity	0.3	0.4	0.8	1.4	2.2	3.1	4.2	5.8	7.6	9.4
Hydrogen	0.0	0.0	0.1	0.2	0.4	0.6	0.8	1.0	1.2	1.5
Total	89.4	95.0	101.1	106.7	109.5	110.5	112.9	115.7	119.4	123.6

Fuels in All Transport, Region AFRICA (Units: EJ/y)

Fuel	2005	2010	2015	2020	2025	2030	2035	2040	2045	2050
Other (Coal)	0.0	0.0	0.1	0.1	0.1	0.2	0.0	0.0	0.0	0.0
Jetfuels	0.3	0.4	0.5	0.6	0.7	0.9	1.1	1.5	2.0	2.5
Bio-Jetfuels	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Gasoline	0.9	1.2	1.4	1.7	1.9	1.9	1.8	1.6	1.3	1.2
Diesel	1.7	1.7	1.7	1.8	2.0	2.3	2.7	3.2	3.8	4.3
Bio-Methanol	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1
Bio-Ethanol	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.2	0.2
Bio-Syngas	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0
CNG	0.0	0.0	0.0	0.1	0.1	0.1	0.2	0.2	0.2	0.2
Biofuel(Diesel)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Electricity	0.0	0.0	0.0	0.1	0.1	0.1	0.2	0.3	0.3	0.5
Hydrogen	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0
Total	3.0	3.4	3.9	4.5	5.1	5.7	6.4	7.1	8.0	9.0

Fuels in All Transport, Region ASIA (Units: EJ/y)

Fuel	2005	2010	2015	2020	2025	2030	2035	2040	2045	2050
Other (Coal)	0.0	0.0	0.1	0.1	0.1	0.2	0.0	0.0	0.0	0.0
Jetfuels	0.7	0.9	1.1	1.4	1.7	2.0	2.2	2.5	2.8	3.0
Bio-Jetfuels	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Gasoline	1.5	1.9	2.1	2.4	2.5	2.5	2.6	2.6	2.4	2.1
Diesel	4.2	4.1	4.5	4.9	5.4	5.9	6.4	6.8	7.2	7.7
Bio-Methanol	0.0	0.0	0.0	0.1	0.1	0.2	0.3	0.3	0.2	0.1
Bio-Ethanol	0.0	0.0	0.0	0.1	0.1	0.2	0.2	0.2	0.3	0.5
Bio-Syngas	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0
CNG	0.0	0.1	0.1	0.1	0.1	0.2	0.3	0.4	0.5	0.5
Biofuel(Diesel)	0.0	0.0	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0
Electricity	0.0	0.0	0.0	0.1	0.1	0.2	0.3	0.4	0.6	0.8
Hydrogen	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1
Total	6.4	7.0	8.1	9.3	10.4	11.5	12.4	13.3	14.1	14.8

Fuels in All Transport, Region BRAZIL (Units: EJ/y)

Fuel	2005	2010	2015	2020	2025	2030	2035	2040	2045	2050
Other (Coal)	0.0	0.0	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0
Jetfuels	0.2	0.2	0.2	0.2	0.3	0.3	0.4	0.5	0.5	0.6
Bio-Jetfuels	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Gasoline	0.9	0.9	1.2	1.2	1.2	1.2	1.1	0.8	0.5	0.3
Diesel	1.0	1.1	1.1	1.2	1.3	1.4	1.6	1.8	1.9	1.9
Bio-Methanol	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Bio-Ethanol	0.2	0.4	0.3	0.3	0.3	0.3	0.3	0.3	0.4	0.6
Bio-Syngas	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CNG	0.1	0.1	0.1	0.1	0.2	0.2	0.3	0.2	0.2	0.2
Biofuel(Diesel)	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1
Electricity	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.2	0.2	0.3
Hydrogen	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Total	2.4	2.8	3.1	3.3	3.5	3.6	3.8	3.9	4.0	4.1

Fuels in All Transport, Region CANADA (Units: EJ/y)

Fuel	2005	2010	2015	2020	2025	2030	2035	2040	2045	2050
Other (Coal)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Jetfuels	0.2	0.2	0.3	0.3	0.3	0.3	0.3	0.3	0.4	0.4
Bio-Jetfuels	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Gasoline	1.2	1.2	1.1	1.1	1.0	0.8	0.6	0.4	0.2	0.1
Diesel	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.8	0.8	0.8
Bio-Methanol	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bio-Ethanol	0.0	0.0	0.1	0.1	0.1	0.0	0.1	0.1	0.1	0.2
Bio-Syngas	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CNG	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1
Biofuel(Diesel)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Electricity	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.2	0.2
Hydrogen	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	2.2	2.2	2.2	2.2	2.2	2.0	1.9	1.8	1.8	1.8

Fuels in All Transport, Region CHINA (Units: EJ/y)

Fuel	2005	2010	2015	2020	2025	2030	2035	2040	2045	2050
Other (Coal)	0.6	0.6	0.6	0.7	0.7	0.2	0.1	0.0	0.0	0.0
Jetfuels	0.6	0.7	1.0	1.2	1.5	1.7	2.0	2.2	2.4	2.6
Bio-Jetfuels	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Gasoline	0.6	0.9	1.1	1.4	1.9	2.3	2.9	3.2	3.4	3.0
Diesel	3.7	4.7	5.6	6.3	6.8	7.4	7.8	8.1	8.5	8.9
Methanol	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bio-Methanol	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Bio-Ethanol	0.0	0.0	0.0	0.0	0.1	0.1	0.2	0.2	0.3	0.4
Bio-Syngas	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

CNG	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.2	0.2	0.3
Biofuel(Diesel)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Electricity	0.0	0.0	0.1	0.1	0.2	0.3	0.4	0.5	0.7	0.9
Hydrogen	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1
Total	5.6	7.1	8.4	9.9	11.3	12.2	13.4	14.6	15.7	16.4

Fuels in All Transport, Region EEUR (Units: EJ/y)

Fuel	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**	**2050**
Other (Coal)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Jetfuels	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Bio-Jetfuels	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Gasoline	0.4	0.4	0.4	0.4	0.4	0.3	0.2	0.2	0.1	0.1
Diesel	0.3	0.3	0.3	0.3	0.4	0.4	0.4	0.4	0.4	0.4
Bio-Methanol	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bio-Ethanol	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Bio-Syngas	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CNG	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Biofuel(Diesel)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Electricity	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1
Hydrogen	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	0.7	0.8	0.9	0.9	0.9	0.8	0.8	0.8	0.8	0.8

Fuels in All Transport, Region FSU (Units: EJ/y)

Fuel	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**	**2050**
Other (Coal)	0.0	0.0	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0
Jetfuels	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.3	0.3
Bio-Jetfuels	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Gasoline	0.6	0.7	0.8	0.8	0.8	0.8	0.7	0.6	0.4	0.3
Diesel	1.5	1.6	1.7	1.8	1.9	2.1	2.2	2.4	2.7	2.8
Bio-Methanol	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0
Bio-Ethanol	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.2	0.2
Bio-Syngas	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CNG	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1
Biofuel(Diesel)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Electricity	0.0	0.0	0.0	0.1	0.1	0.1	0.2	0.2	0.3	0.3
Hydrogen	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	2.2	2.5	2.8	3.0	3.3	3.4	3.6	3.8	3.9	4.1

Fuels in All Transport, Region INDIA (Units: EJ/y)

Fuel	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**	**2050**
Other (Coal)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Jetfuels	0.1	0.2	0.3	0.3	0.4	0.5	0.6	0.8	1.0	1.1
Bio-Jetfuels	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Gasoline	0.3	0.5	0.6	0.7	0.9	1.1	1.3	1.7	2.2	2.5
Diesel	1.0	1.2	1.0	1.1	1.2	1.3	1.4	1.5	1.6	1.9
Bio-Methanol	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bio-Ethanol	0.0	0.0	0.1	0.2	0.2	0.3	0.3	0.4	0.6	0.7
Bio-Syngas	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CNG	0.0	0.1	0.1	0.2	0.3	0.3	0.5	0.4	0.3	0.3
Biofuel(Diesel)	0.0	0.0	0.2	0.3	0.3	0.3	0.3	0.4	0.4	0.5
Electricity	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.2	0.2	0.3
Hydrogen	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	1.5	2.0	2.3	2.8	3.3	3.9	4.6	5.4	6.4	7.4

Fuels in All Transport, Region LAM (Units: EJ/y)

Fuel	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**	**2050**
Other (Coal)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Jetfuels	0.2	0.2	0.3	0.4	0.4	0.5	0.6	0.6	0.7	0.8
Bio-Jetfuels	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Gasoline	0.8	1.0	1.1	1.2	1.3	1.2	1.1	0.8	0.7	0.6
Diesel	2.9	3.2	3.5	3.8	4.1	4.4	4.8	5.1	5.3	5.5
Bio-Methanol	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.0
Bio-Ethanol	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.2	0.2	0.3
Bio-Syngas	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CNG	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.4	0.4	0.4
Biofuel(Diesel)	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0
Electricity	0.0	0.0	0.0	0.0	0.1	0.1	0.2	0.3	0.4	0.6
Hydrogen	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	4.2	4.7	5.2	5.8	6.4	6.8	7.2	7.6	7.9	8.2

Fuels in All Transport, Region MEA (Units: EJ/y)

Fuel	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**	**2050**
Other (Coal)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Jetfuels	0.5	0.5	0.6	0.7	0.8	0.9	1.1	1.3	1.5	1.8
Bio-Jetfuels	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Gasoline	1.0	1.2	1.4	1.6	1.7	1.7	1.5	1.3	0.9	0.7
Diesel	3.5	3.9	4.0	4.1	4.3	4.7	5.3	5.8	6.3	6.5
Bio-Methanol	0.0	0.0	0.0	0.1	0.1	0.1	0.2	0.2	0.1	0.1
Bio-Ethanol	0.0	0.0	0.0	0.1	0.1	0.1	0.2	0.2	0.2	0.3
Bio-Syngas	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0
CNG	0.0	0.1	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1
Biofuel(Diesel)	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0
Electricity	0.0	0.0	0.0	0.0	0.1	0.1	0.2	0.3	0.4	0.6
Hydrogen	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	5.0	5.7	6.1	6.6	7.2	7.8	8.5	9.1	9.7	10.2

Fuels in All Transport, Region MEXICO (Units: EJ/y)

Fuel	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**	**2050**
Other (Coal)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Jetfuels	0.1	0.1	0.2	0.2	0.2	0.3	0.3	0.4	0.4	0.4
Bio-Jetfuels	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Gasoline	0.7	0.8	0.9	1.0	1.0	1.0	0.9	0.8	0.6	0.5
Diesel	1.2	1.3	1.3	1.4	1.5	1.7	1.8	2.0	2.2	2.2
Bio-Methanol	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bio-Ethanol	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.2
Bio-Syngas	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CNG	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1
Biofuel(Diesel)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Electricity	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.2	0.2
Hydrogen	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	1.9	2.2	2.5	2.6	2.9	3.1	3.3	3.5	3.6	3.7

Fuels in All Transport, Region PACIFIC (Units: EJ/y)

Fuel	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**	**2050**
Other (Coal)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Jetfuels	0.9	0.8	0.9	0.9	0.9	0.9	0.9	0.9	1.0	1.0
Bio-Jetfuels	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Gasoline	3.0	3.6	3.0	2.6	2.1	1.7	1.3	0.9	0.5	0.3
Diesel	3.4	2.6	2.7	2.6	2.6	2.5	2.5	2.5	2.5	2.5
Bio-Methanol	0.0	0.1	0.1	0.2	0.2	0.1	0.1	0.0	0.1	0.1
Bio-Ethanol	0.0	0.0	0.1	0.2	0.2	0.1	0.2	0.2	0.3	0.3
Bio-Syngas	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CNG	0.0	0.0	0.0	0.1	0.1	0.2	0.2	0.2	0.2	0.1
Biofuel(Diesel)	0.0	0.0	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0
Electricity	0.0	0.0	0.1	0.1	0.2	0.3	0.3	0.4	0.5	0.5
Hydrogen	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1
Total	7.3	7.2	7.1	6.9	6.5	5.9	5.5	5.3	5.1	5.0

Fuels in All Transport, Region RUSSIA (Units: EJ/y)

Fuel	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**	**2050**
Other (Coal)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Jetfuels	0.4	0.5	0.6	0.6	0.7	0.8	1.0	1.1	1.3	1.4
Bio-Jetfuels	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Gasoline	1.2	1.4	1.5	1.5	1.4	1.3	1.1	0.8	0.6	0.5
Diesel	0.6	0.6	0.9	0.9	0.8	0.9	1.0	1.1	1.2	1.2
Bio-Methanol	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bio-Ethanol	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.2	0.2
Bio-Syngas	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0
CNG	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1
Biofuel(Diesel)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Electricity	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2
Hydrogen	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	2.3	2.6	3.1	3.2	3.3	3.3	3.4	3.5	3.6	3.7

Fuels in All Transport, Region USA (Units: EJ/y)

Fuel	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**	**2050**
Other (Coal)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Jetfuels	3.5	3.4	3.4	3.5	3.7	3.8	4.0	4.2	4.3	4.4
Bio-Jetfuels	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.0	0.1	0.1
Gasoline	16.4	16.6	15.9	14.7	12.5	9.2	6.3	4.2	2.8	1.9
Diesel	6.9	6.4	6.5	6.6	6.8	7.1	7.3	7.0	6.9	6.9
Bio-Methanol	0.0	0.0	0.0	0.1	0.2	0.2	0.3	0.4	0.5	0.4
Bio-Ethanol	0.3	0.9	1.3	1.4	1.6	1.7	1.8	1.8	1.8	1.9
Bio-Syngas	0.0	0.0	0.2	1.1	0.7	0.5	0.4	0.3	0.1	0.1
CNG	0.0	0.0	0.0	0.0	0.0	0.2	0.3	0.5	0.6	0.5
Biofuel(Diesel)	0.0	0.0	0.1	0.1	0.2	0.2	0.2	0.1	0.2	0.3
Electricity	0.0	0.0	0.1	0.2	0.3	0.6	0.9	1.4	1.9	2.3
Hydrogen	0.0	0.0	0.0	0.1	0.2	0.2	0.3	0.3	0.4	0.5
Total	27.3	27.3	27.6	27.9	26.2	23.8	21.7	20.3	19.6	19.2

Fuels in All Transport, Region WEUR (Units: EJ/y)										
Fuel	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**	**2050**
Other (Coal)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Jetfuels	2.2	2.2	2.3	2.4	2.6	2.8	2.9	3.0	3.1	3.2
Bio-Jetfuels	0.0	0.1	0.2	0.3	0.2	0.1	0.1	0.0	0.0	0.0
Gasoline	5.4	6.2	6.3	5.9	4.8	3.4	2.4	1.6	0.9	0.4
Diesel	9.6	8.4	7.8	7.4	7.4	7.7	7.7	7.8	7.9	7.8
Bio-Methanol	0.0	0.0	0.1	0.2	0.3	0.4	0.4	0.3	0.2	0.2
Bio-Ethanol	0.0	0.1	0.2	0.3	0.5	0.6	0.7	0.9	1.1	1.2
Bio-Syngas	0.0	0.0	0.1	0.2	0.2	0.2	0.1	0.1	0.0	0.0
CNG	0.0	0.0	0.1	0.1	0.2	0.3	0.5	0.5	0.4	0.4
Biofuel(Diesel)	0.1	0.3	0.6	0.8	0.5	0.3	0.3	0.2	0.1	0.1
Electricity	0.1	0.1	0.2	0.4	0.7	0.8	1.0	1.2	1.4	1.6
Hydrogen	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.2	0.3
Total	17.5	17.5	17.9	17.9	17.4	16.7	16.1	15.6	15.3	15.2

Technology Mix (billion v-km/y)

Technology Mix of Mileage for Cars (Units: billion v-km/y)										
Technology	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**	**2050**
Electric Vehicle	0	1	117	288	536	894	1414	2168	3156	4298
Hydrogen Fuel Cell	0	0	58	140	275	438	587	824	1023	1359
Hydrogen Hybrid	0	0	26	59	111	177	223	276	287	279
Gas Fuel Hybrid	0	0	99	232	409	647	964	1177	1209	1274
Gas Fuel ICEV	51	104	232	395	603	708	773	813	761	700
Liquid Fuel Plug-in	0	0	120	313	624	1115	1832	2923	4222	4895
Liquid Fuel Hybrid	11	79	347	777	1471	2578	4067	4901	5675	6905
Liquid Fuel ICEV	10652	11788	12377	12614	12235	11238	9728	8486	7529	6679
Total	10714	11972	13376	14818	16263	17793	19589	21568	23862	26389

Technology Mix of Mileage for Cars, Region AFRICA (Units: billion v-km/y)										
Technology	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**	**2050**
Electric Vehicle	0	0	3	9	16	27	43	66	98	97
Hydrogen Fuel Cell	0	0	1	3	7	13	16	22	29	25
Hydrogen Hybrid	0	0	3	5	9	14	20	29	25	22
Gas Fuel Hybrid	0	0	3	6	11	17	25	37	52	72
Gas Fuel ICEV	1	3	7	12	17	25	34	46	40	34
Liquid Fuel Plug-in	0	0	3	9	18	33	56	86	129	201
Liquid Fuel Hybrid	0	2	9	21	40	71	120	200	328	535
Liquid Fuel ICEV	222	282	344	419	493	522	527	505	489	466
Total	223	288	373	484	612	721	842	991	1190	1452

Technology Mix of Mileage for Cars, Region ASIA (Units: billion v-km/y)										
Technology	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**	**2050**
Electric Vehicle	0	0	6	15	29	49	77	120	184	260
Hydrogen Fuel Cell	0	0	2	7	15	25	33	44	57	75
Hydrogen Hybrid	0	0	5	10	16	25	37	52	71	61
Gas Fuel Hybrid	0	0	5	11	20	31	46	66	94	130
Gas Fuel ICEV	8	15	24	35	49	68	91	121	131	113
Liquid Fuel Plug-in	0	0	6	16	33	59	102	165	248	376
Liquid Fuel Hybrid	0	4	17	39	73	129	219	363	596	970
Liquid Fuel ICEV	397	494	586	700	766	842	913	952	969	935
Total	404	512	650	833	1001	1227	1517	1882	2350	2921

Technology Mix of Mileage for Cars, Region BRAZIL (Units: billion v-km/y)										
Technology	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**	**2050**
Electric Vehicle	0	0	4	9	17	29	46	70	102	113
Hydrogen Fuel Cell	0	0	1	2	6	10	14	19	26	35
Hydrogen Hybrid	0	0	3	6	9	14	20	28	24	21
Gas Fuel Hybrid	0	0	3	7	12	18	27	39	55	51
Gas Fuel ICEV	10	16	23	32	43	58	77	70	60	52
Liquid Fuel Plug-in	0	0	4	10	19	35	58	87	134	200
Liquid Fuel Hybrid	0	3	11	25	46	81	137	226	364	471
Liquid Fuel ICEV	301	372	430	445	446	446	422	384	297	229
Total	311	390	478	534	598	690	801	923	1063	1173

Technology Mix of Mileage for Cars, Region CANADA (Units: billion v-km/y)										
Technology	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**	**2050**
Electric Vehicle	0	0	3	8	15	25	39	59	88	125
Hydrogen Fuel Cell	0	0	0	1	5	8	12	18	25	35
Hydrogen Hybrid	0	0	3	6	8	12	10	9	8	7
Gas Fuel Hybrid	0	0	3	7	12	18	27	40	36	31
Gas Fuel ICEV	0	1	4	7	12	11	9	8	7	6

Liquid Fuel Plug-in	0	0	3	9	17	31	50	80	129	155
Liquid Fuel Hybrid	0	3	11	24	44	77	130	141	121	105
Liquid Fuel ICEV	313	329	333	326	302	258	187	137	102	79
Total	314	332	360	387	415	440	466	491	516	541

Technology Mix of Mileage for Cars, Region CHINA (Units: billion v-km/y)

Technology	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**	**2050**
Electric Vehicle	0	0	4	11	21	36	57	90	140	216
Hydrogen Fuel Cell	0	0	4	10	16	24	33	40	51	64
Hydrogen Hybrid	0	0	3	6	10	15	22	31	43	58
Gas Fuel Hybrid	0	0	3	7	12	19	28	40	57	79
Gas Fuel ICEV	1	3	7	12	18	26	36	49	65	86
Liquid Fuel Plug-in	0	0	4	12	23	42	72	110	156	233
Liquid Fuel Hybrid	0	2	11	24	47	82	140	233	377	581
Liquid Fuel ICEV	213	305	401	531	650	792	943	1073	1168	1176
Total	213	310	438	613	797	1037	1332	1668	2057	2494

Technology Mix of Mileage for Cars, Region EEUR (Units: billion v-km/y)

Technology	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**	**2050**
Electric Vehicle	0	0	0	2	4	7	12	18	28	40
Hydrogen Fuel Cell	0	0	0	0	0	1	3	5	7	10
Hydrogen Hybrid	0	0	0	0	0	0	0	0	0	0
Gas Fuel Hybrid	0	0	1	3	5	8	12	17	16	14
Gas Fuel ICEV	0	1	2	4	6	8	9	7	6	5
Liquid Fuel Plug-in	0	0	1	4	7	13	21	34	54	71
Liquid Fuel Hybrid	0	1	5	10	18	32	54	66	62	53
Liquid Fuel ICEV	131	142	145	145	139	121	94	68	51	39
Total	131	144	155	167	180	191	205	216	225	233

Technology Mix of Mileage for Cars, Region FSU (Units: billion v-km/y)

Technology	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**	**2050**
Electric Vehicle	0	0	2	5	9	15	24	36	47	53
Hydrogen Fuel Cell	0	0	0	1	1	3	5	7	6	5
Hydrogen Hybrid	0	0	0	2	3	6	9	10	8	7
Gas Fuel Hybrid	0	0	2	4	7	11	16	23	32	44
Gas Fuel ICEV	0	2	4	7	10	15	21	21	18	15
Liquid Fuel Plug-in	0	0	2	5	10	19	32	52	79	94
Liquid Fuel Hybrid	0	2	6	14	26	45	76	126	204	270
Liquid Fuel ICEV	179	214	233	251	267	279	278	248	184	138
Total	180	218	249	287	334	392	460	522	579	628

Technology Mix of Mileage for Cars, Region INDIA (Units: billion v-km/y)

Technology	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**	**2050**
Electric Vehicle	0	0	2	4	7	12	20	32	49	76
Hydrogen Fuel Cell	0	0	2	3	6	9	13	18	22	29
Hydrogen Hybrid	0	0	1	2	3	5	8	11	15	20
Gas Fuel Hybrid	0	0	1	2	4	7	10	14	20	28
Gas Fuel ICEV	1	2	4	6	9	12	17	22	29	39
Liquid Fuel Plug-in	0	0	2	4	8	15	25	42	70	101
Liquid Fuel Hybrid	0	1	4	9	18	31	53	88	144	235
Liquid Fuel ICEV	111	149	196	261	316	384	468	571	702	859
Total	112	153	211	292	371	475	614	798	1051	1387

Technology Mix of Mileage for Cars, Region LAM (Units: billion v-km/y)

Technology	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**	**2050**
Electric Vehicle	0	0	3	7	13	22	34	53	80	99
Hydrogen Fuel Cell	0	0	1	4	7	11	15	20	27	35
Hydrogen Hybrid	0	0	2	4	7	11	16	23	20	17
Gas Fuel Hybrid	0	0	2	5	9	14	20	29	42	58
Gas Fuel ICEV	22	25	34	46	60	79	103	133	115	99
Liquid Fuel Plug-in	0	0	3	7	15	26	45	70	105	162
Liquid Fuel Hybrid	0	2	8	18	35	61	102	170	276	435
Liquid Fuel ICEV	211	266	310	358	409	400	388	345	326	251
Total	233	293	362	449	555	623	725	844	990	1156

Technology Mix of Mileage for Cars, Region MEA (Units: billion v-km/y)

Technology	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**	**2050**
Electric Vehicle	0	0	3	8	15	25	40	62	86	74
Hydrogen Fuel Cell	0	0	0	3	7	12	17	23	21	18
Hydrogen Hybrid	0	0	2	5	8	13	19	27	23	20
Gas Fuel Hybrid	0	0	2	6	10	16	24	34	48	67
Gas Fuel ICEV	1	4	7	12	17	25	34	32	28	24
Liquid Fuel Plug-in	0	0	3	9	17	31	53	79	120	146
Liquid Fuel Hybrid	0	3	10	21	40	71	120	198	325	528
Liquid Fuel ICEV	271	324	380	451	494	529	530	496	421	315

Total	273	330	409	514	610	722	836	952	1072	1191

Technology Mix of Mileage for Cars, Region MEXICO (Units: billion v-km/y)

Technology	2005	2010	2015	2020	2025	2030	2035	2040	2045	2050
Electric Vehicle	0	0	2	5	9	14	23	35	41	45
Hydrogen Fuel Cell	0	0	0	1	3	6	9	12	16	21
Hydrogen Hybrid	0	0	1	2	4	7	10	14	13	11
Gas Fuel Hybrid	0	0	2	4	6	10	15	22	31	42
Gas Fuel ICEV	0	0	2	4	6	10	14	20	17	15
Liquid Fuel Plug-in	0	0	2	5	10	18	30	51	79	107
Liquid Fuel Hybrid	0	2	6	13	25	43	73	120	197	288
Liquid Fuel ICEV	172	213	251	265	285	298	302	281	255	197
Total	172	215	265	299	348	405	476	555	648	724

Technology Mix of Mileage for Cars, Region PACIFIC (Units: billion v-km/y)

Technology	2005	2010	2015	2020	2025	2030	2035	2040	2045	2050
Electric Vehicle	0	0	10	25	46	76	120	181	260	364
Hydrogen Fuel Cell	0	0	4	15	27	41	59	83	113	152
Hydrogen Hybrid	0	0	4	7	14	12	10	9	8	6
Gas Fuel Hybrid	0	0	9	20	36	57	85	82	71	61
Gas Fuel ICEV	0	0	9	20	34	29	25	22	19	16
Liquid Fuel Plug-in	0	0	10	27	53	92	149	243	277	244
Liquid Fuel Hybrid	3	13	39	82	152	253	303	262	226	195
Liquid Fuel ICEV	969	1025	1018	954	822	638	452	329	245	188
Total	972	1038	1103	1150	1183	1198	1204	1210	1218	1227

Technology Mix of Mileage for Cars, Region RUSSIA (Units: billion v-km/y)

Technology	2005	2010	2015	2020	2025	2030	2035	2040	2045	2050
Electric Vehicle	0	0	1	5	11	19	32	51	58	65
Hydrogen Fuel Cell	0	0	0	1	2	2	2	5	8	13
Hydrogen Hybrid	0	0	0	0	2	5	6	5	4	4
Gas Fuel Hybrid	0	0	3	7	12	20	29	42	59	83
Gas Fuel ICEV	0	3	6	11	17	25	29	25	22	19
Liquid Fuel Plug-in	0	0	4	10	19	35	58	89	109	94
Liquid Fuel Hybrid	0	3	12	25	48	84	141	232	318	398
Liquid Fuel ICEV	334	407	432	452	458	440	397	301	220	166
Total	334	412	457	511	568	628	695	750	800	841

Technology Mix of Mileage for Cars, Region USA (Units: billion v-km/y)

Technology	2005	2010	2015	2020	2025	2030	2035	2040	2045	2050
Electric Vehicle	0	1	44	107	196	325	510	780	1156	1638
Hydrogen Fuel Cell	0	0	43	90	149	217	260	361	402	544
Hydrogen Hybrid	0	0	0	4	17	38	34	29	25	25
Gas Fuel Hybrid	0	0	37	86	153	241	360	444	383	330
Gas Fuel ICEV	2	10	50	100	165	143	123	106	91	79
Liquid Fuel Plug-in	0	0	43	113	224	404	655	1047	1685	1925
Liquid Fuel Hybrid	6	32	132	293	551	968	1639	1767	1524	1315
Liquid Fuel ICEV	4097	4311	4307	4149	3789	3195	2282	1648	1223	931
Total	4105	4354	4656	4941	5244	5530	5863	6182	6490	6788

Technology Mix of Mileage for Cars, Region WEUR (Units: billion v-km/y)

Technology	2005	2010	2015	2020	2025	2030	2035	2040	2045	2050
Electric Vehicle	0	0	29	70	129	214	337	513	738	1032
Hydrogen Fuel Cell	0	0	0	0	25	56	96	147	213	296
Hydrogen Hybrid	0	0	0	0	0	0	0	0	0	0
Gas Fuel Hybrid	0	0	25	58	102	161	240	248	214	184
Gas Fuel ICEV	4	19	49	88	136	175	151	130	112	97
Liquid Fuel Plug-in	0	0	29	75	150	263	424	687	848	786
Liquid Fuel Hybrid	1	7	65	159	309	551	760	710	612	528
Liquid Fuel ICEV	2731	2955	3012	2907	2599	2094	1545	1148	876	709
Total	2736	2982	3209	3356	3449	3514	3553	3584	3613	3632

Technology Mix for Cars (million)

Technology Mix for Cars (Units: million)

Technology	2005	2010	2015	2020	2025	2030	2035	2040	2045	2050
Electric Vehicle	0	0	8	19	36	60	95	146	212	288
Hydrogen Fuel Cell	0	0	3	8	17	28	38	54	68	91
Hydrogen Hybrid	0	0	2	4	7	12	15	18	19	18
Gas Fuel Hybrid	0	0	7	16	28	44	65	79	81	86
Gas Fuel ICEV	3	7	16	27	41	49	53	55	52	47
Liquid Fuel Plug-in	0	0	8	21	42	75	124	197	279	320
Diesel Type Hybrid	0	0	7	17	35	62	88	103	121	142
Gasoline Type Hybrid	1	5	17	35	64	111	181	220	257	321
Diesel Type ICEV	84	75	76	82	94	103	104	110	120	121
Gasoline Type ICEV	636	723	763	773	735	656	554	464	390	332
Total	723	810	906	1002	1098	1199	1317	1447	1598	1766

Technology Mix for Cars, Region AFRICA (Units: million)

Technology	2005	2010	2015	2020	2025	2030	2035	2040	2045	2050
Electric Vehicle	0	0	0	1	1	2	3	5	8	7
Hydrogen Fuel Cell	0	0	0	0	1	1	1	2	2	2
Hydrogen Hybrid	0	0	0	0	1	1	2	2	2	2
Gas Fuel Hybrid	0	0	0	1	1	1	2	3	4	6
Gas Fuel ICEV	0	0	1	1	1	2	3	4	3	3
Liquid Fuel Plug-in	0	0	0	1	1	3	4	7	11	17
Diesel Type Hybrid	0	0	0	1	1	2	4	6	10	16
Gasoline Type Hybrid	0	0	1	1	2	4	6	10	17	28
Diesel Type ICEV	2	2	2	2	3	3	5	7	10	11
Gasoline Type ICEV	16	21	26	32	38	40	39	35	30	28
Total	18	23	30	40	50	59	69	81	97	119

Technology Mix for Cars, Region ASIA (Units: million)

Technology	2005	2010	2015	2020	2025	2030	2035	2040	2045	2050
Electric Vehicle	0	0	0	1	2	3	5	8	12	17
Hydrogen Fuel Cell	0	0	0	0	1	2	2	3	4	5
Hydrogen Hybrid	0	0	0	1	1	2	2	3	4	4
Gas Fuel Hybrid	0	0	0	1	1	2	3	4	6	8
Gas Fuel ICEV	0	1	1	2	3	4	6	8	8	7
Liquid Fuel Plug-in	0	0	0	1	2	4	6	10	16	24
Diesel Type Hybrid	0	0	0	1	2	3	5	8	13	21
Gasoline Type Hybrid	0	0	1	2	3	5	9	15	24	40
Diesel Type ICEV	0	0	0	1	2	3	5	8	13	19
Gasoline Type ICEV	25	31	37	43	47	50	53	52	48	40
Total	25	32	41	52	63	77	95	118	148	184

Technology Mix for Cars, Region BRAZIL (Units: million)

Technology	2005	2010	2015	2020	2025	2030	2035	2040	2045	2050
Electric Vehicle	0	0	0	1	1	2	3	4	7	7
Hydrogen Fuel Cell	0	0	0	0	0	1	1	1	2	2
Hydrogen Hybrid	0	0	0	0	1	1	1	2	1	1
Gas Fuel Hybrid	0	0	0	0	1	1	2	2	3	3
Gas Fuel ICEV	1	1	1	2	3	4	5	4	4	3
Liquid Fuel Plug-in	0	0	0	1	1	2	4	5	8	13
Diesel Type Hybrid	0	0	0	0	1	2	3	5	8	7
Gasoline Type Hybrid	0	0	1	1	2	3	6	10	15	23
Diesel Type ICEV	1	1	2	3	3	3	4	6	6	5
Gasoline Type ICEV	18	22	25	25	25	25	22	18	13	10
Total	20	25	30	34	38	43	50	58	67	74

Technology Mix for Cars, Region CANADA (Units: million)

Technology	2005	2010	2015	2020	2025	2030	2035	2040	2045	2050
Electric Vehicle	0	0	0	0	1	1	2	4	5	8
Hydrogen Fuel Cell	0	0	0	0	0	0	1	1	2	2
Hydrogen Hybrid	0	0	0	0	0	1	1	1	0	0
Gas Fuel Hybrid	0	0	0	0	1	1	2	2	2	2
Gas Fuel ICEV	0	0	0	0	1	1	1	0	0	0
Liquid Fuel Plug-in	0	0	0	1	1	2	3	5	8	9
Diesel Type Hybrid	0	0	0	0	1	2	3	2	2	2
Gasoline Type Hybrid	0	0	0	1	2	3	5	6	5	4
Diesel Type ICEV	0	1	1	1	2	2	2	2	2	1
Gasoline Type ICEV	18	19	19	18	16	13	9	6	5	3
Total	19	20	21	23	25	26	28	29	31	32

Technology Mix for Cars, Region CHINA (Units: million)

Technology	2005	2010	2015	2020	2025	2030	2035	2040	2045	2050
Electric Vehicle	0	0	0	1	1	2	4	6	9	14

Hydrogen Fuel Cell	0	0	0	1	1	2	2	3	3	4
Hydrogen Hybrid	0	0	0	0	1	1	1	2	3	4
Gas Fuel Hybrid	0	0	0	0	1	1	2	3	4	5
Gas Fuel ICEV	0	0	0	1	1	2	2	3	4	6
Liquid Fuel Plug-in	0	0	0	1	2	3	5	7	10	16
Diesel Type Hybrid	0	0	0	1	1	2	3	5	9	14
Gasoline Type Hybrid	0	0	1	1	2	4	6	10	17	25
Diesel Type ICEV	3	4	7	10	10	9	10	11	13	18
Gasoline Type ICEV	12	16	20	25	34	44	53	61	65	60
Total	14	21	29	41	53	69	89	111	137	166

Technology Mix for Cars, Region EEUR (Units: million)

Technology	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**	**2050**
Electric Vehicle	0	0	0	0	0	1	1	1	2	3
Hydrogen Fuel Cell	0	0	0	0	0	0	0	0	1	1
Hydrogen Hybrid	0	0	0	0	0	0	0	0	0	0
Gas Fuel Hybrid	0	0	0	0	0	1	1	1	1	1
Gas Fuel ICEV	0	0	0	0	1	1	1	1	1	0
Liquid Fuel Plug-in	0	0	0	0	1	1	2	3	4	6
Diesel Type Hybrid	0	0	0	0	1	1	2	1	1	1
Gasoline Type Hybrid	0	0	0	1	1	2	3	4	4	3
Diesel Type ICEV	0	0	0	0	1	1	1	1	1	1
Gasoline Type ICEV	10	11	12	11	11	9	6	4	3	2
Total	11	12	13	14	15	16	17	18	18	19

Technology Mix for Cars, Region FSU (Units: million)

Technology	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**	**2050**
Electric Vehicle	0	0	0	0	1	1	2	3	3	4
Hydrogen Fuel Cell	0	0	0	0	0	0	0	1	0	0
Hydrogen Hybrid	0	0	0	0	0	0	1	1	1	1
Gas Fuel Hybrid	0	0	0	0	1	1	1	2	2	3
Gas Fuel ICEV	0	0	0	1	1	1	2	2	1	1
Liquid Fuel Plug-in	0	0	0	0	1	1	2	4	6	7
Diesel Type Hybrid	0	0	0	0	1	1	2	3	6	5
Gasoline Type Hybrid	0	0	0	1	1	2	4	6	10	16
Diesel Type ICEV	1	0	1	1	1	1	2	4	3	3
Gasoline Type ICEV	13	16	17	18	19	20	19	15	11	8
Total	14	17	19	22	25	30	35	40	44	48

Technology Mix for Cars, Region INDIA (Units: million)

Technology	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**	**2050**
Electric Vehicle	0	0	0	0	0	1	1	2	3	5
Hydrogen Fuel Cell	0	0	0	0	0	1	1	1	1	2
Hydrogen Hybrid	0	0	0	0	0	0	1	1	1	1
Gas Fuel Hybrid	0	0	0	0	0	0	1	1	1	2
Gas Fuel ICEV	0	0	0	0	1	1	1	1	2	3
Liquid Fuel Plug-in	0	0	0	0	1	1	2	3	5	7
Diesel Type Hybrid	0	0	0	0	0	1	1	2	3	5
Gasoline Type Hybrid	0	0	0	0	1	1	2	4	7	11
Diesel Type ICEV	2	2	1	1	1	1	2	3	4	6
Gasoline Type ICEV	6	8	12	16	20	24	29	35	43	52
Total	7	10	14	19	25	32	41	53	70	92

Technology Mix for Cars, Region LAM (Units: million)

Technology	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**	**2050**
Electric Vehicle	0	0	0	0	1	1	2	3	5	6
Hydrogen Fuel Cell	0	0	0	0	0	1	1	1	2	2
Hydrogen Hybrid	0	0	0	0	0	1	1	1	1	1
Gas Fuel Hybrid	0	0	0	0	1	1	1	2	3	4
Gas Fuel ICEV	1	2	2	3	4	5	6	8	7	6
Liquid Fuel Plug-in	0	0	0	0	1	2	3	4	7	10
Diesel Type Hybrid	0	0	0	0	1	1	2	4	6	10
Gasoline Type Hybrid	0	0	0	1	1	3	4	7	12	18
Diesel Type ICEV	0	0	0	1	1	1	2	4	6	5
Gasoline Type ICEV	13	16	19	22	25	24	22	18	15	11
Total	15	18	23	28	35	39	46	53	62	73

Technology Mix for Cars, Region MEA (Units: million)

Technology	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**	**2050**
Electric Vehicle	0	0	0	0	1	1	2	4	5	4
Hydrogen Fuel Cell	0	0	0	0	0	1	1	1	1	1
Hydrogen Hybrid	0	0	0	0	0	1	1	1	1	1
Gas Fuel Hybrid	0	0	0	0	1	1	1	2	3	4
Gas Fuel ICEV	0	0	0	1	1	1	2	2	2	1
Liquid Fuel Plug-in	0	0	0	0	1	2	3	5	7	8

Diesel Type Hybrid	0	0	0	0	1	1	2	4	6	10
Gasoline Type Hybrid	0	0	0	1	2	3	5	8	12	20
Diesel Type ICEV	1	1	1	1	1	2	3	4	6	6
Gasoline Type ICEV	14	17	21	24	27	28	27	24	17	12
Total	15	19	23	29	35	41	47	54	61	68

Technology Mix for Cars, Region MEXICO (Units: million)

Technology	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**	**2050**
Electric Vehicle	0	0	0	0	1	1	2	3	3	4
Hydrogen Fuel Cell	0	0	0	0	0	0	1	1	1	2
Hydrogen Hybrid	0	0	0	0	0	1	1	1	1	1
Gas Fuel Hybrid	0	0	0	0	1	1	1	2	3	4
Gas Fuel ICEV	0	0	0	0	1	1	1	2	2	1
Liquid Fuel Plug-in	0	0	0	0	1	2	3	4	7	9
Diesel Type Hybrid	0	0	0	0	1	1	2	4	6	8
Gasoline Type Hybrid	0	0	0	1	1	3	4	7	11	18
Diesel Type ICEV	0	0	0	1	1	1	2	4	5	5
Gasoline Type ICEV	15	19	22	23	24	25	24	21	17	13
Total	15	19	23	26	31	36	42	49	57	64

Technology Mix for Cars, Region PACIFIC (Units: million)

Technology	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**	**2050**
Electric Vehicle	0	0	1	2	4	6	10	14	21	29
Hydrogen Fuel Cell	0	0	0	1	2	3	5	7	9	13
Hydrogen Hybrid	0	0	0	1	1	1	1	1	1	1
Gas Fuel Hybrid	0	0	1	2	3	5	7	7	6	5
Gas Fuel ICEV	0	0	1	2	3	2	2	2	2	1
Liquid Fuel Plug-in	0	0	1	2	4	7	12	20	23	20
Diesel Type Hybrid	0	0	1	2	4	6	5	5	4	3
Gasoline Type Hybrid	0	1	3	5	9	15	20	17	15	13
Diesel Type ICEV	10	9	8	8	9	9	8	7	6	5
Gasoline Type ICEV	69	75	75	69	58	43	29	20	14	10
Total	79	85	90	94	97	98	98	99	99	100

Technology Mix for Cars, Region RUSSIA (Units: million)

Technology	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**	**2050**
Electric Vehicle	0	0	0	0	1	1	2	4	4	5
Hydrogen Fuel Cell	0	0	0	0	0	0	0	0	1	1
Hydrogen Hybrid	0	0	0	0	0	0	0	0	0	0
Gas Fuel Hybrid	0	0	0	1	1	2	2	3	5	6
Gas Fuel ICEV	0	0	0	1	1	2	2	2	2	1
Liquid Fuel Plug-in	0	0	0	1	1	3	4	7	8	7
Diesel Type Hybrid	0	0	0	1	1	2	4	6	6	6
Gasoline Type Hybrid	0	0	1	1	2	4	7	11	18	25
Diesel Type ICEV	0	0	0	1	1	2	4	4	4	3
Gasoline Type ICEV	25	31	32	33	33	31	26	19	13	9
Total	25	31	35	39	43	48	53	57	61	64

Technology Mix for Cars, Region USA (Units: million)

Technology	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**	**2050**
Electric Vehicle	0	0	2	6	11	18	28	43	64	91
Hydrogen Fuel Cell	0	0	2	5	8	12	14	19	21	29
Hydrogen Hybrid	0	0	0	0	1	2	2	2	1	1
Gas Fuel Hybrid	0	0	2	5	8	13	19	23	20	17
Gas Fuel ICEV	0	1	3	5	9	8	6	6	5	4
Liquid Fuel Plug-in	0	0	2	6	12	22	35	56	89	102
Diesel Type Hybrid	0	0	2	5	10	18	31	32	27	23
Gasoline Type Hybrid	0	2	5	11	19	34	56	63	54	47
Diesel Type ICEV	1	1	3	6	11	19	17	15	13	11
Gasoline Type ICEV	221	232	230	219	194	154	107	76	55	41
Total	222	235	252	267	283	299	317	334	351	367

Technology Mix for Cars, Region WEUR (Units: million)

Technology	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**	**2050**
Electric Vehicle	0	0	2	6	10	17	27	41	59	83
Hydrogen Fuel Cell	0	0	0	0	2	5	8	12	18	25
Hydrogen Hybrid	0	0	0	0	0	0	0	0	0	0
Gas Fuel Hybrid	0	0	2	5	8	13	20	21	18	15
Gas Fuel ICEV	0	2	4	7	11	15	13	11	9	8
Liquid Fuel Plug-in	0	0	2	6	12	21	35	57	70	65
Diesel Type Hybrid	0	0	2	5	11	19	19	17	14	12
Gasoline Type Hybrid	0	1	3	8	15	26	43	42	36	31
Diesel Type ICEV	62	54	49	45	48	44	38	32	28	24
Gasoline Type ICEV	161	187	197	192	164	127	88	60	42	33
Total	223	244	262	274	282	287	290	293	295	297

CO2 Emission

CO2-Emission from Cars (Units: GtCO2/y)										
Region	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**	**2050**
USA	1.1	1.2	1.1	1.0	0.9	0.7	0.5	0.4	0.3	0.2
RUSSIA	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
PACIFIC	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.0
MEXICO	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0
MEA	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
LAM	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
INDIA	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.2
FSU	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0
WEUR	0.5	0.5	0.5	0.5	0.4	0.4	0.3	0.2	0.2	0.1
EEUR	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CHINA	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.3	0.3	0.3
CANADA	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0
BRAZIL	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
ASIA	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
AFRICA	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Total	2.6	2.8	2.9	2.9	2.8	2.5	2.3	2.0	1.7	1.5

CO2-Emission (Units: GtCO2/y)										
Region	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**	**2050**
USA	1.9	1.9	1.9	1.8	1.7	1.5	1.4	1.3	1.2	1.1
RUSSIA	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
PACIFIC	0.5	0.5	0.5	0.5	0.4	0.4	0.4	0.4	0.3	0.3
MEXICO	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
MEA	0.4	0.4	0.4	0.5	0.5	0.6	0.6	0.6	0.7	0.7
LAM	0.3	0.3	0.4	0.4	0.4	0.5	0.5	0.5	0.5	0.5
INDIA	0.1	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.4	0.4
FSU	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.3
WEUR	1.3	1.2	1.2	1.2	1.1	1.1	1.0	1.0	1.0	0.9
EEUR	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
CHINA	0.5	0.6	0.7	0.8	0.9	0.9	1.0	1.1	1.1	1.1
CANADA	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1
BRAZIL	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
ASIA	0.5	0.5	0.6	0.7	0.8	0.8	0.9	1.0	1.0	1.0
AFRICA	0.2	0.3	0.3	0.3	0.4	0.4	0.5	0.5	0.6	0.6
Total	6.5	6.8	7.1	7.4	7.6	7.6	7.7	7.9	7.9	7.9