



Energy Efficiency Transport

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TRANSPORT

Energy intensity of the global transport sector, defined as the ratio of energy consumption of transport to GDP, declined by an average of 1.8% per year between 2000 and 2014, reflected mostly in road transport.⁴⁹ (→ See Figure 46.) While transport energy intensity declined over this period in most regions, it remained virtually unchanged in Latin America and the Middle East.

Fuel economy of road transport improved at an average annual rate of 2% between 2008 and 2013. Improvement rates were higher on average in OECD countries (2.6%) than in non-OECD countries (0.2%) due to national policies and programmes – particularly fuel economy standards – in the former.⁵⁰ By 2013, eight countries (Japan, the United States, Canada, China, the Republic of Korea, Mexico, Brazil and India) and the EU had proposed or established fuel economy standards for passenger and light-commercial vehicles as well as light trucks.⁵¹

Although their contribution remains quite small, one of the factors driving improvements in fuel economy on a final energy basis is rising sales of electric vehicles (EVs) and plug-in hybrid (electric and natural gas) vehicles.⁵² By one estimate, global sales of plug-in EVs were up more than 70% in 2015, and by year's end, more than 1 million plug-in EVs were estimated to be on the world's roads, with the largest number operating in the United States.⁵³ Despite federal and state subsidies, sales of plug-in EVs in the United States fell by more than 5% in 2015 due to the drop in gasoline prices.⁵⁴ By contrast, EV sales rose in some countries, including China and Norway, due to aggressive incentives, and EV registration in Europe more than doubled in 2015, while new hybrid vehicle registration increased by 23%.⁵⁵

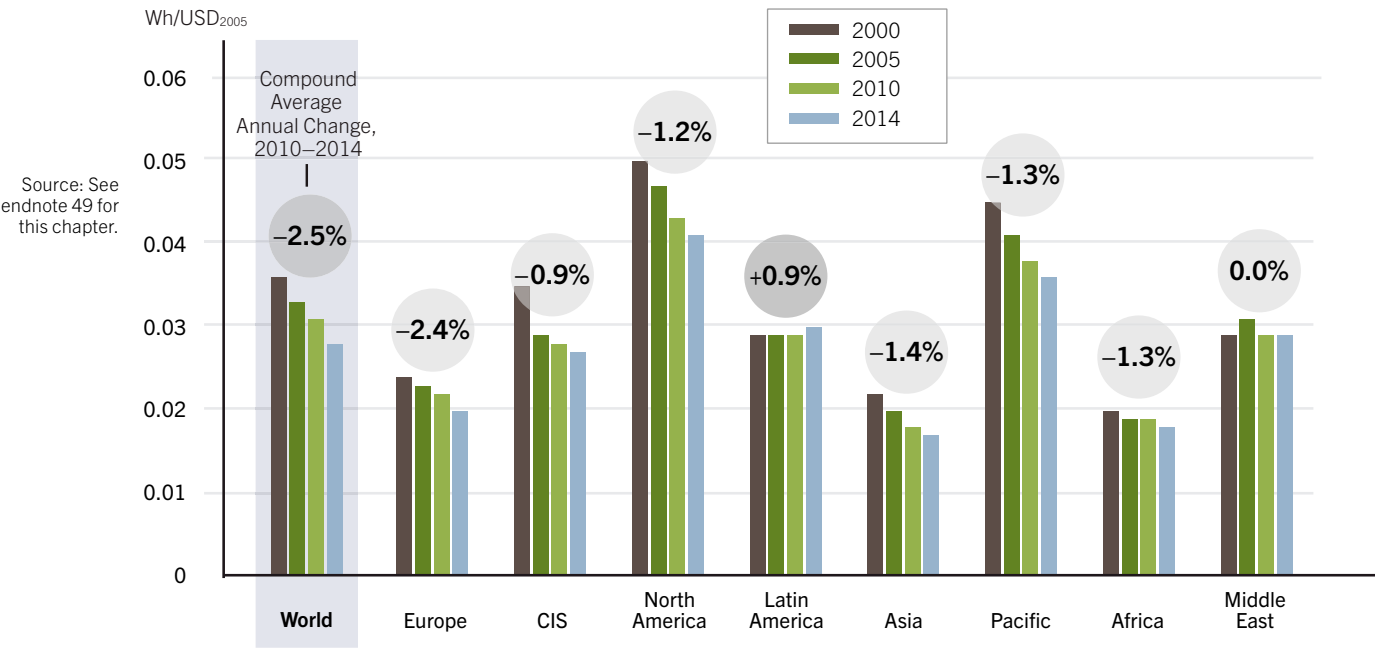
Because, the share of EVs is less than 0.1% of the global vehicle market, continuing advances in internal combustion efficiency constitute a critical component of energy efficiency improvements in road transport.⁵⁶

Efficiency of transport also is increasing through the promotion of more-sustainable mobility practices, such as bus rapid transit (BRT). BRT systems continue to spread, and by early 2016 were located in at least 200 cities on all continents, transporting more than 33 million passengers per day – up from 150 cities and 28 million passengers in 2013.⁵⁷

Fuel efficiency is improving for other types of transport, such as aviation and shipping, both of which still have large potential for energy savings. Aviation accounts for about 13% of fossil fuel use in global transport.⁵⁸ Between 1990 and 2000, the average fuel efficiency of new aircraft of similar size improved by about 10%, while aviation activity for both passenger travel and freight transport grew by a factor of 2.5, but it levelled off thereafter.⁵⁹ Fuel efficiency can be increased further through improved infrastructure; operational measures, such as reducing the weight of on-board equipment; and improved aircraft design and materials.⁶⁰

The shipping industry consumes about 250–325 million tonnes of fuel per year (4% of the total share of transport use).⁶¹ The efficiency of individual ships varies greatly based on design, fuel and power sources, and operations. The efficiency of ships built during the 1970s was consistently poor, followed by improvements across all ship types and size categories in the 1980s (by 22–28%) due to a combination of rapidly increasing fuel prices and constant or declining freight rates.⁶² Between

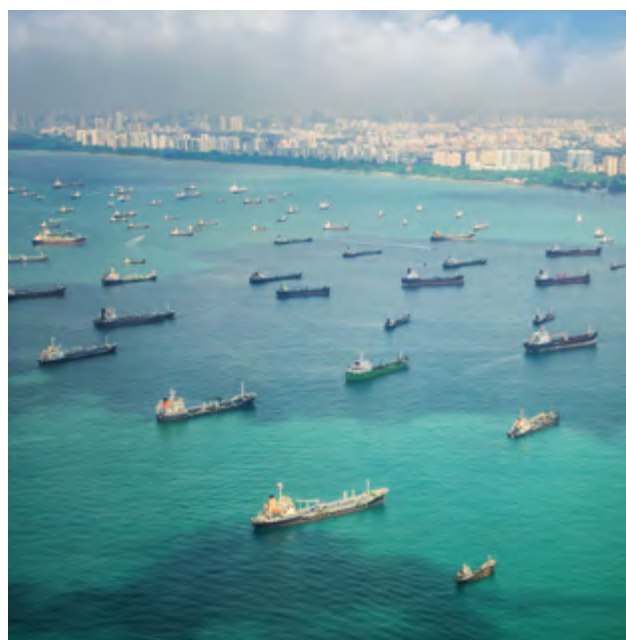
Figure 46. Energy Intensity in Transport, Selected Regions and World, 2000, 2005, 2010 and 2014



Dollars are at constant purchasing power parities.

i Except in the context of renewable power, EVs are not necessarily more energy-efficient than internal combustion engine vehicles on a primary energy basis (and emissions may be higher), depending on the energy source. As the shares of non-thermal renewables increase in the power mix, the contribution of these vehicles to overall (primary) energy efficiency will only increase.

1990 and 2008, design-related efficiency of new ships declined by about 10% because cargo capacity or capital costs were given higher priority than fuel efficiency, but thereafter it began to improve again.⁶³



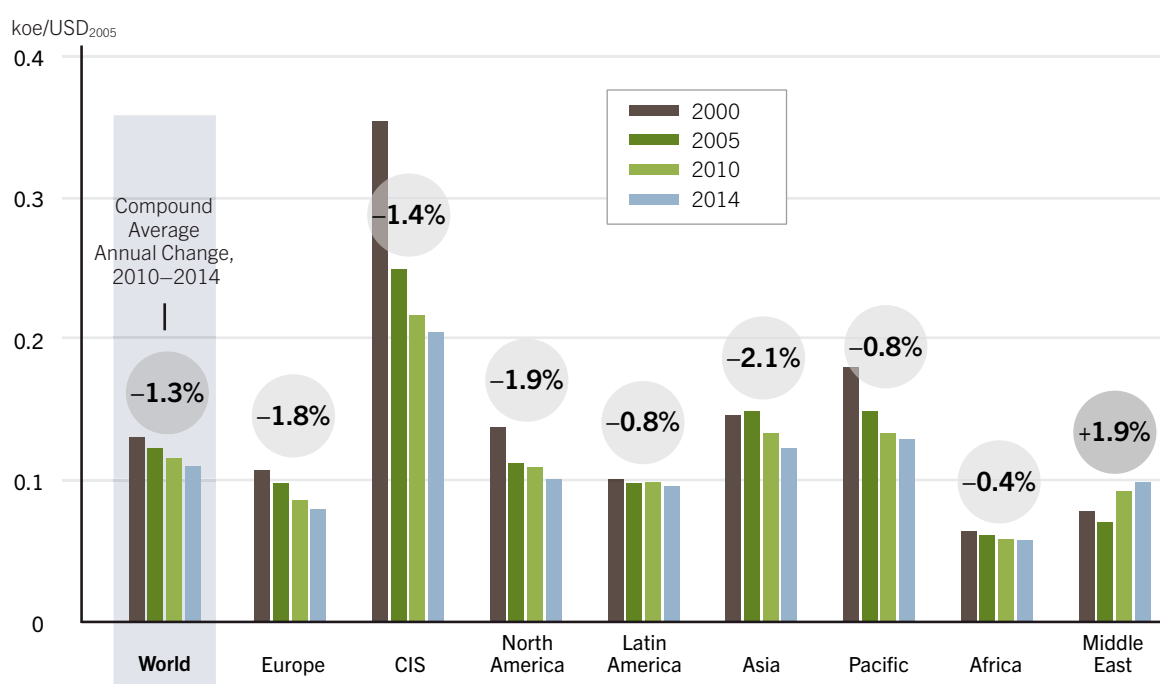
INDUSTRY AND POWER

Industry accounted for approximately 29% of global TFEC in 2013, including electricity demand, and for almost 40% of TFEC when certain metals smelting and non-energy uses are included.⁶⁴

Between 2000 and 2014, global energy intensity in industryⁱ decreased by an average of 1.2% annually and declined across all regions except the Middle East.⁶⁵ (→ See Figure 47.) Energy intensity of industry declined by an average of almost 4% annually in the CIS, while in Latin America and Africa the rate of decline averaged below 1% a year.⁶⁶ However, because this indicator is influenced largely by structural changes in the economy, it is unclear what portion of these reductions reflects improvements in energy efficiency. For instance, in OECD countries, reductions in industrial energy intensity were driven by a combination of changes in economic activities (e.g., caused by economic recession, energy efficiency improvements, and structural effects (e.g., displacement of energy-intensive manufacturing), with the latter taking a prevailing role.⁶⁷

In the power sector, energy efficiency is affected mostly by energy losses in generation at thermal power plants and through transmission and distribution losses. Fossil fuel power plants convert only about one-third of their primary energy inputs into electricity, while conversion losses for non-thermal renewables are either relatively low or otherwise insignificant. Therefore, achieving greater shares of non-thermal renewable power increases primary energy efficiency by reducing conversion losses.

Figure 47. Energy Intensity in Industry, Selected Regions and World, 2000, 2005, 2010 and 2014



Source: See endnote 65 for this chapter.

Dollars are at constant purchasing power parities.

ⁱ The energy intensity of industry is defined as the ratio of the final energy consumption of industry over the value added, measured in constant purchasing power parities.