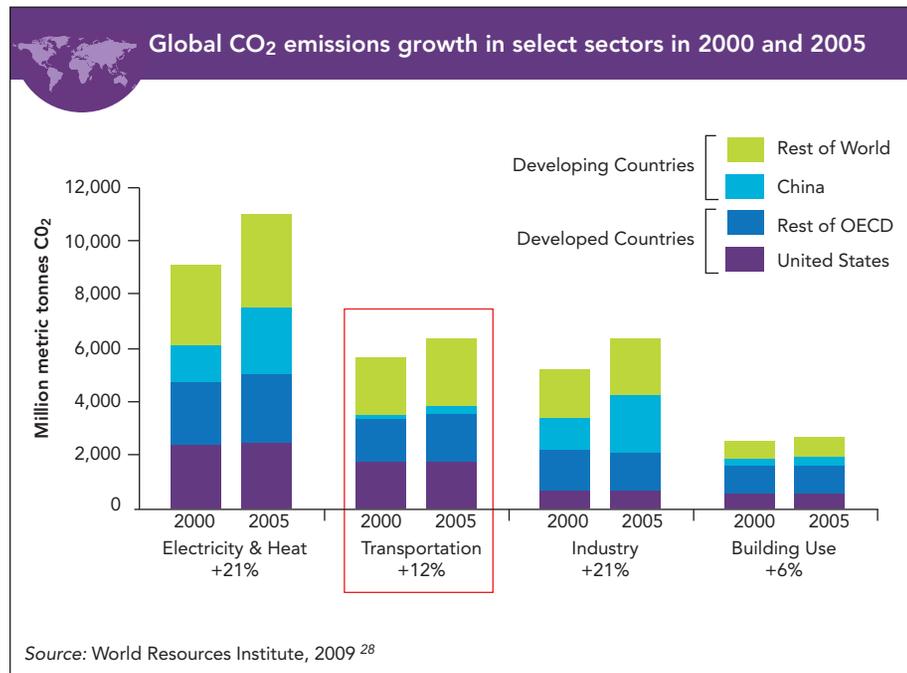


# III. TRANSPORT

Transport of people and goods is integral to the functioning of economies and to economic development. With the rapid growth of international trade and tourism over the past two decades, long-distance transport has become a bigger share of the total. Miles traveled by goods and people have increased markedly and with them pollutant emissions, including carbon dioxide (CO<sub>2</sub>).

Volume of transport matters most to economic activity but transport mix is as important for the environment, with some modes creating little or no pollution compared to others. A comprehensive approach to sustainable transport addresses issues such as access to means of transportation, congestion, urban pollution, climate change, noise and resource use.

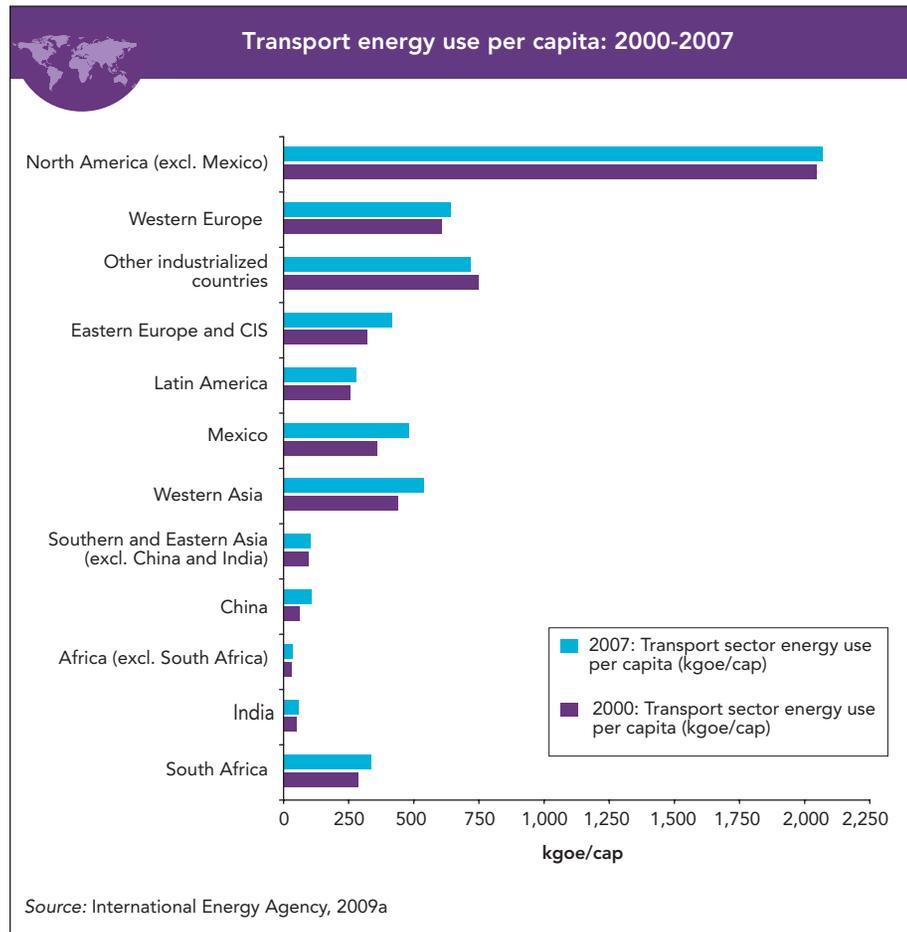


A comprehensive strategy devises short-term, medium-term and long-term policies to **avoid** transport (e.g. shorter distances to work through better urban design), to **shift** towards cleaner modes of transport as well as to **clean** existing modes of transport through better technology (e.g. increased resource-efficiency and reduction of emissions).

Global CO<sub>2</sub> emissions from transport grew 12 per cent between 2000 and 2005, double the rate for buildings but considerably slower than emissions from electricity generation and industry. Growth rates also vary markedly across regions and between developed and developing countries. Developing countries now account for the majority of emissions from electricity and heat as well as industry, while developed countries still account for a majority of emissions in the transport and building use sectors.<sup>29</sup>

Since 1971, global transport energy use rose steadily by 2–2.5 per cent per year. Road transport uses the most energy and has experienced the highest growth.

To compare, in 2007, North Americans consumed more than 2,000 kilogrammes of oil equivalent (kgoe) per person for means of transportation, while in many African countries, people consumed less than 100 kgoe per person.



With development comes mobility, and passenger travel is projected to rise significantly between 2005 and 2050. Almost all the additional travel will happen in developing countries.

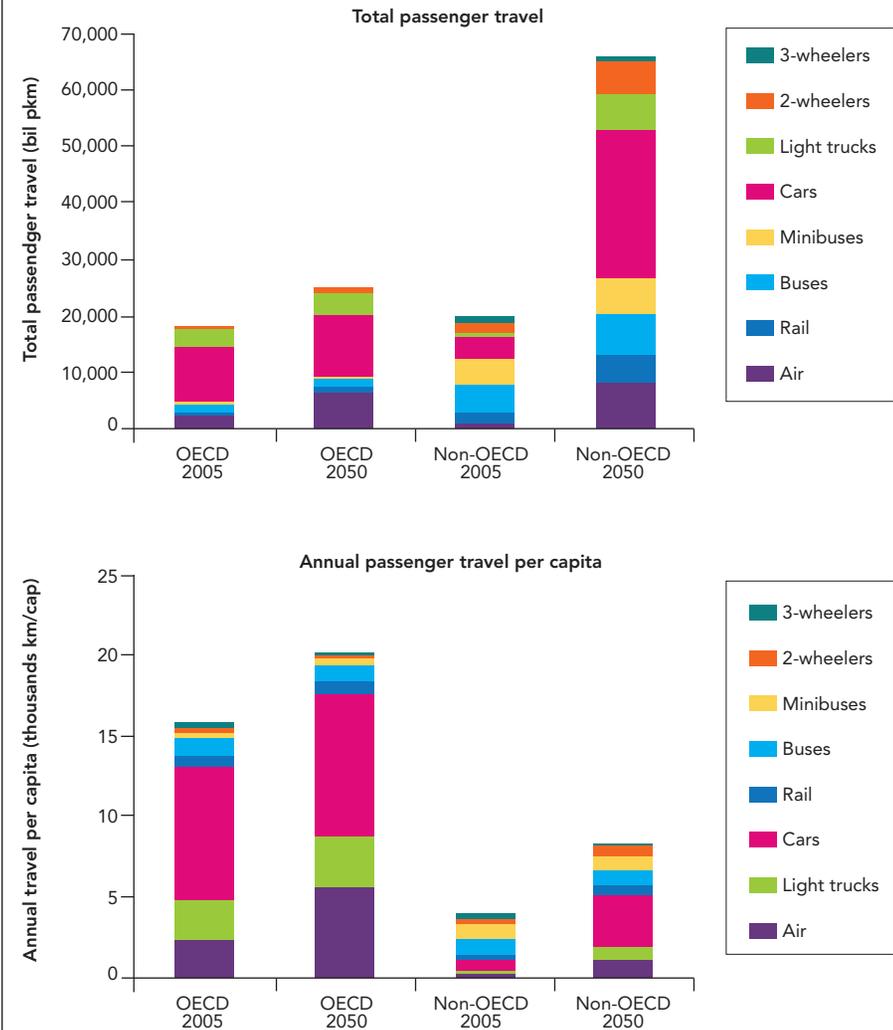
The overall slight increase in passenger travel in OECD countries is mainly driven by increasing air travel, while the more than trebling of passenger travel in non-OECD countries is primarily due to an increase in road travel, much in private cars. The amount of annual passenger travel per person is starkly different between OECD countries and non-OECD countries. Distance traveled per person is expected to grow in both groups of countries to 2050, but much faster in developing countries (a rough doubling) than in developed countries (a one-third increase).

The rise of private vehicle ownership is linked to rising incomes. Still, government policy can help delink the two, as evidenced by Singapore with its auction of private vehicle ownership permits and well-developed public transit. Countries such as Mexico, Indonesia and Brazil have experienced a steep increase of motor vehicle ownership during the past 15 years. The wide gap between Western Europe in 2005 and the United States of America 15 years earlier (when the income level was comparable) is partly a function of size, partly of different patterns of urban development and levels of investment in public transport.

**“Global connections — Increased international air travel is one of the key traces of globalization, bringing cities into closer contact and, at the same time, highlighting differences between them.”**

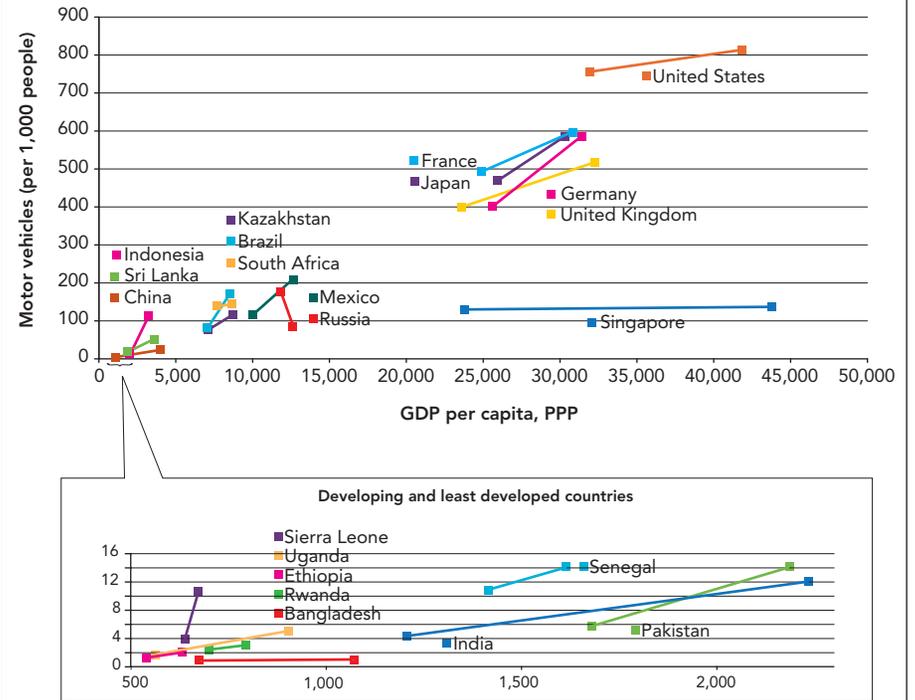
— Ricky Burdett and Deyan Sudjic, authors of “The Endless City”

Trend scenario of passenger travel by motorized mode and region (OECD and non-OECD) — Comparison of baseline scenarios in 2005 and 2050



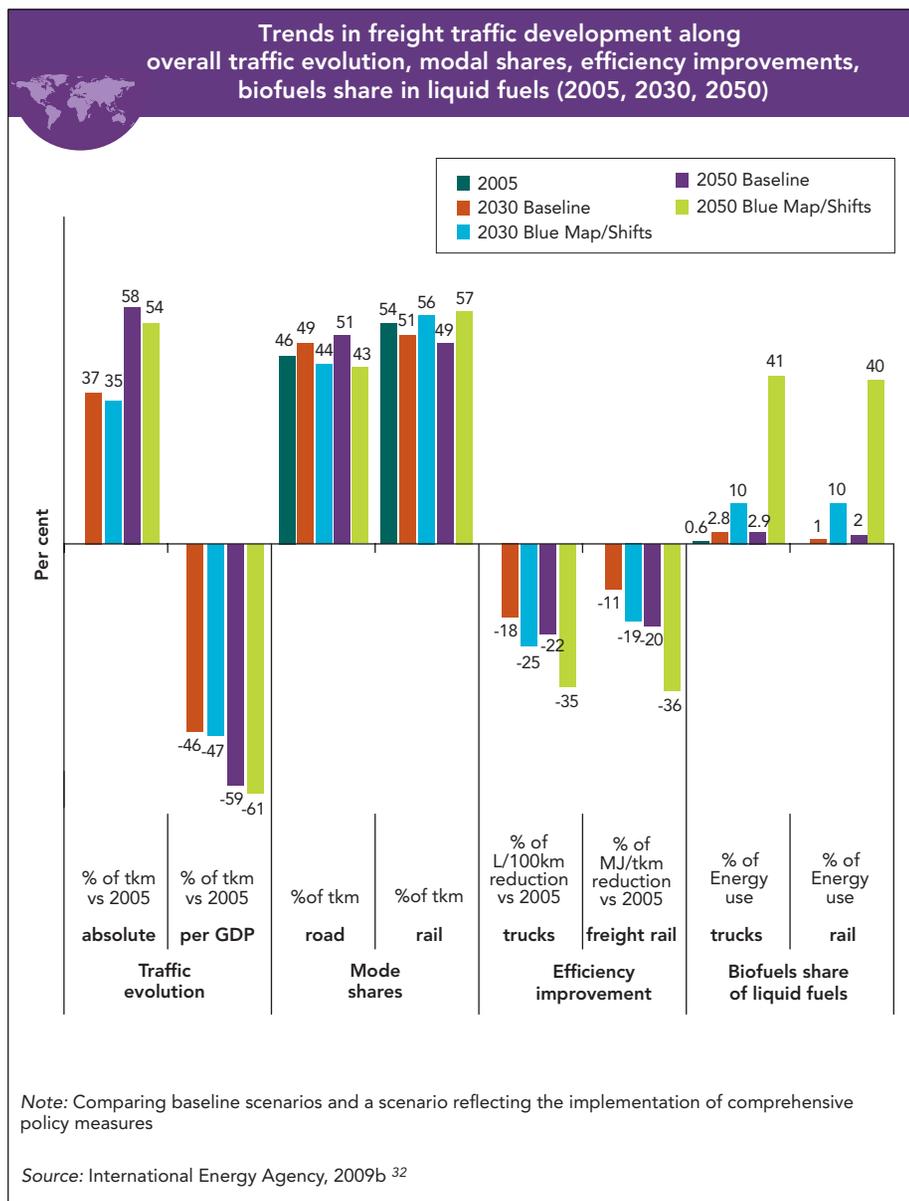
Source: International Energy Agency, 2009b<sup>30</sup>

Development of private motor vehicle ownership and GDP per capita, 1990-2005



Source: The World Bank, 2008

If strong policies are implemented, the three options — increased modal shift, efficiency improvements and the use of alternative fuels — could cut freight-transport-related CO<sub>2</sub> emissions by 70 per cent compared to baseline in 2050 (30 per cent below 2005).<sup>31</sup>



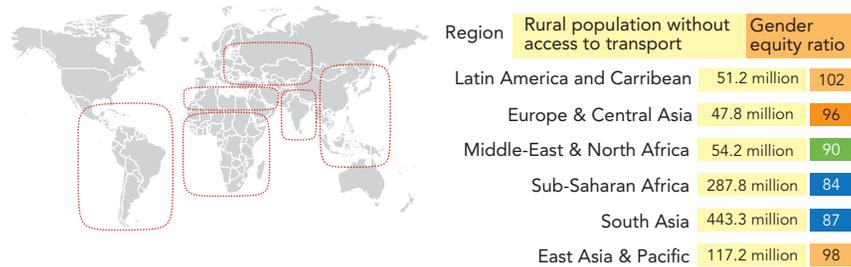
### Lack of adequate transport infrastructure and lack of access to affordable transport services perpetuate poverty and impede achieving the Millennium Development Goals

Road access rates are lowest in sub-Saharan Africa, but there are also some countries in Asia and Latin America where access is very poor. Inadequate access to roads affects women and men and children differently. For example, in countries with lower access rates, the percentage of girls enrolled in schools is lower. Schools may be far and hard to reach, and many households prefer to fund the transport cost for boys to attend schools. Improvements in rural access have been achieved, but big differences remain between and within regions.

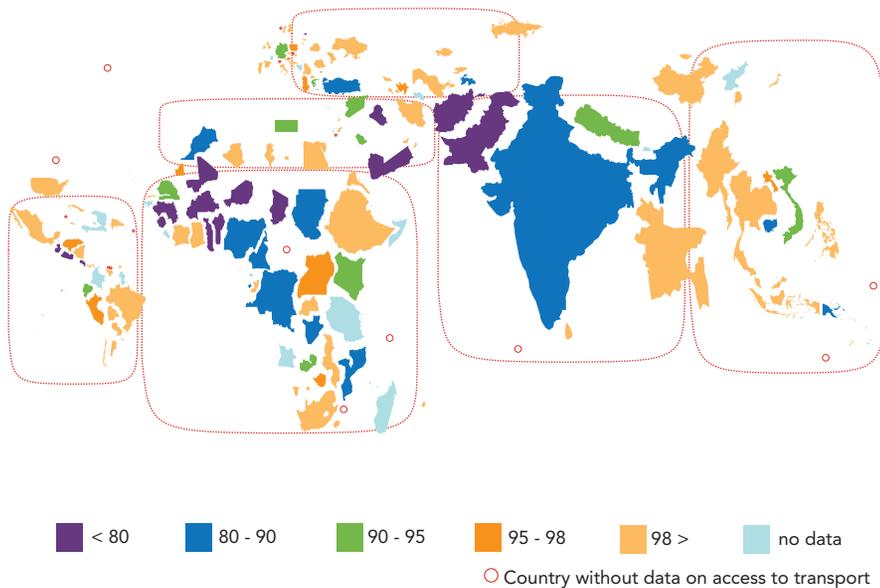
Statistical analysis of the relationship between poverty incidence and road development shows that a decline in poverty rates can — to a significant degree — be attributed to improved road access. In rural Lao People's Democratic Republic, for example, rural poverty incidence declined by almost ten percent between 1997–1998 and 2002–2003. Approximately 13 per cent of this decline can be attributed to improved road access.<sup>33</sup> Similar trends were observed in regions of China and Ecuador.

In addition to the positive effect of universal road access on poverty, dynamic effects on social and economic development may include: 1) possible abandonment of subsistence production by many rural people in favour of migration to urban centres; 2) changes in rural land values as roads bring previously isolated areas into the market economy; 3) new-found profitability of certain investments; and 4) improved flow of market-related information with benefits for economic efficiency.<sup>34</sup>

## Gender equity in relation to rural transport access



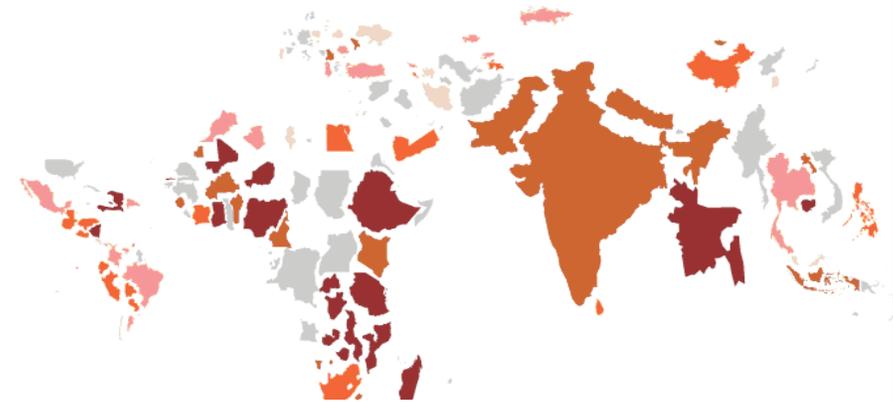
The relative size of a country is in respect of the size of the population without access to rural transport



Source: The World Bank, 2007 <sup>35</sup>

## Poverty in relation to rural transport access

The relative size of a country is in respect of the size of the population without access to rural transport



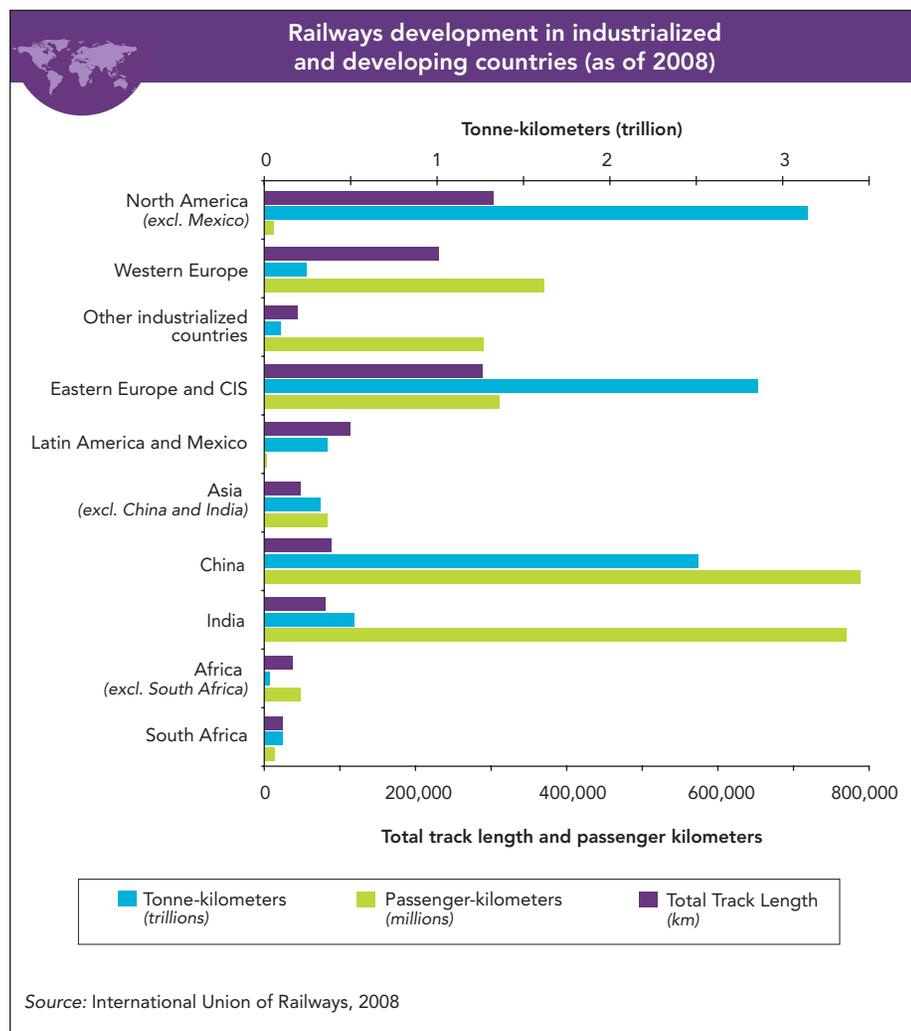
Source: The World Bank, 2009 <sup>36</sup>

“[All countries should] Promote investment and partnerships for the development of sustainable, energy efficient multi-modal transportation systems, including public mass transportation systems and better transportation systems in rural areas, with technical and financial assistance for developing countries and countries with economies in transition.”

— The Johannesburg Plan of Implementation (JPOI),  
III Para. 21 (2002)

## Rail Transport

Railways are an energy efficient and climate-friendly but capital-intensive means of land transport. Whereas most industrialized countries have an extensive railway infrastructure, often with double tracks and electrification, most developing countries have only a limited length of often single tracks. Sub-Saharan Africa, for example, contributes only 5 per cent to the world's total railroad track length, whereas Europe has 42 per cent.



The primary use of railroads differs substantially across countries. North America, excluding Mexico, contains approximately 25 per cent of the world's railroad network and uses it almost exclusively for freight transport, accounting for 33 per cent of the total tonne-km traveled. Conversely, China, which has only about 7 per cent of the total track length, uses railways primarily for passenger transportation. Annually, China's railways accommodate travel of 788,118 million passenger kilometers, as compared to North America's 12,991 million. In India, passenger use of railways is even more dominant.

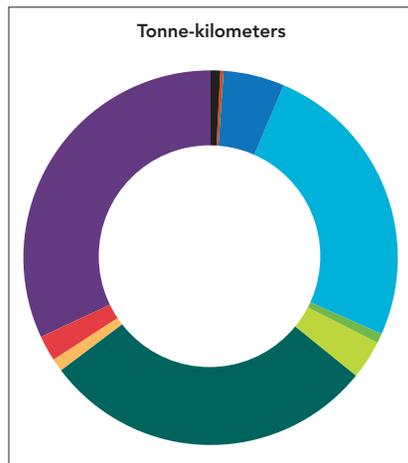
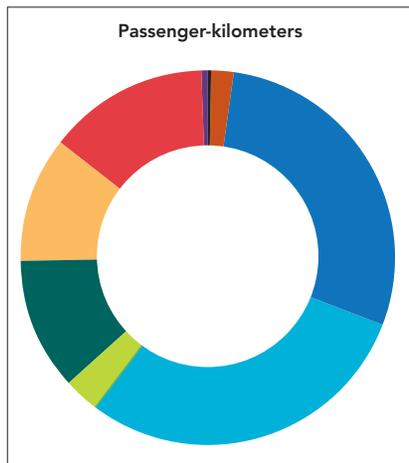
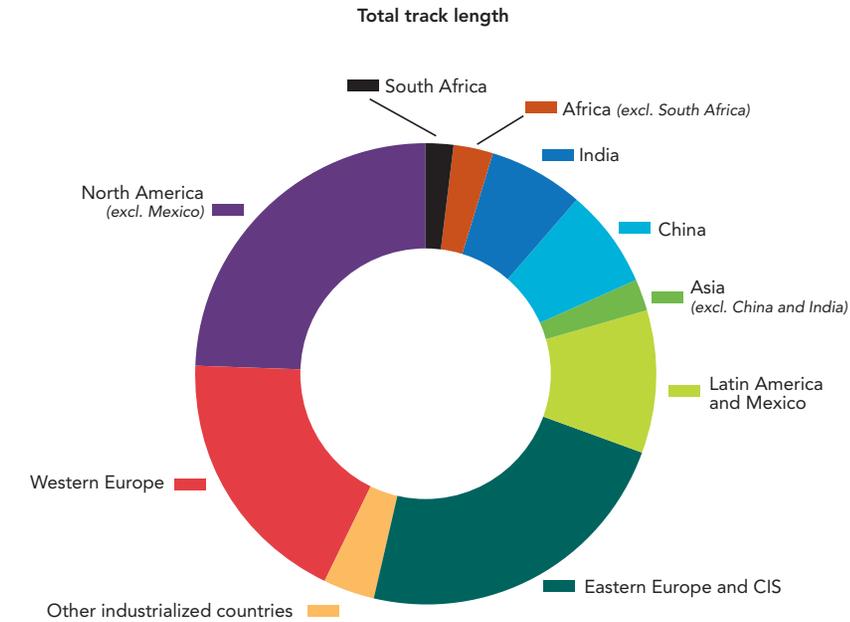
On average, rail systems are significantly more energy efficient at moving freight than almost any other motorized mode. However, apart from a few large countries that move large quantities of raw materials over long distances, such as the Russian Federation, the United States of America, Canada, Australia and China, rail accounts for only a relatively limited share of freight movement compared to truck transport.

Since 1970, the average annual growth rate for road freight measured in tonne-kms has been 3.5 per cent, while rail transport has grown by only 1.1 per cent annually<sup>37</sup>.

**“The agreement on the Trans-Asian Railway Network together with the Intergovernmental Agreement on the Asian Highway Network, linking the landlocked countries, the least developed countries, with the more prosperous coastal areas, is the tremendous way of connectivity that will increase transportation within Asia for trade as well as for shared prosperity.”**

— Dr. Noeleen Heyzer  
United Nations Under-Secretary-General and Executive Secretary  
Economic and Social Commission for Asia and the Pacific

## Global distribution of track length, passenger kilometres and tonne-kilometres

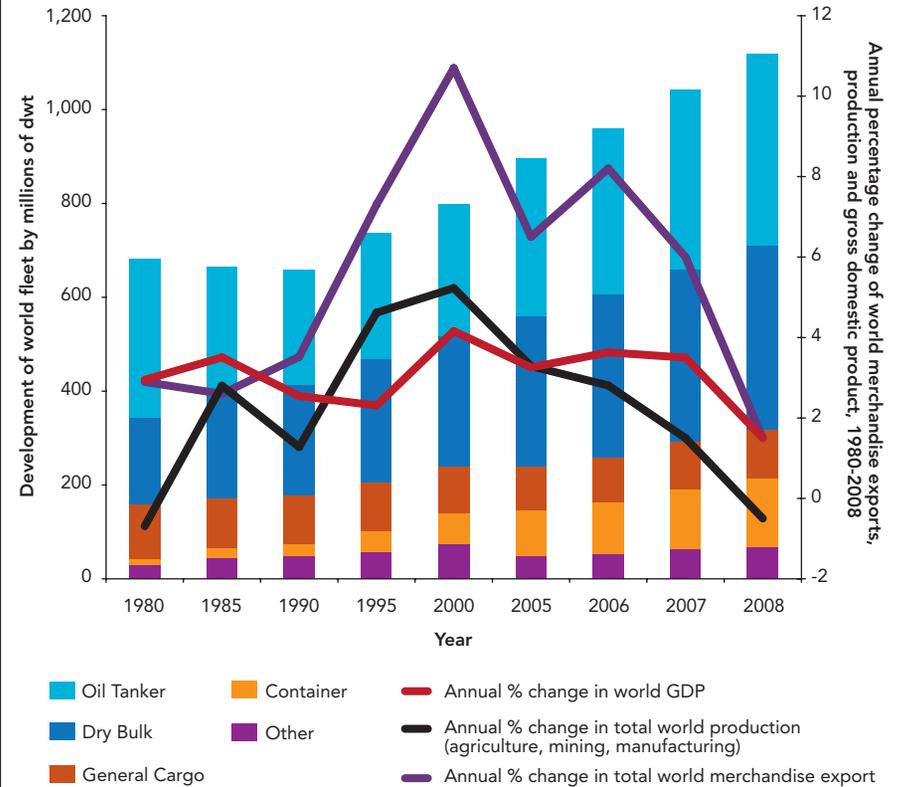


Source: International Union of Railways, 2008

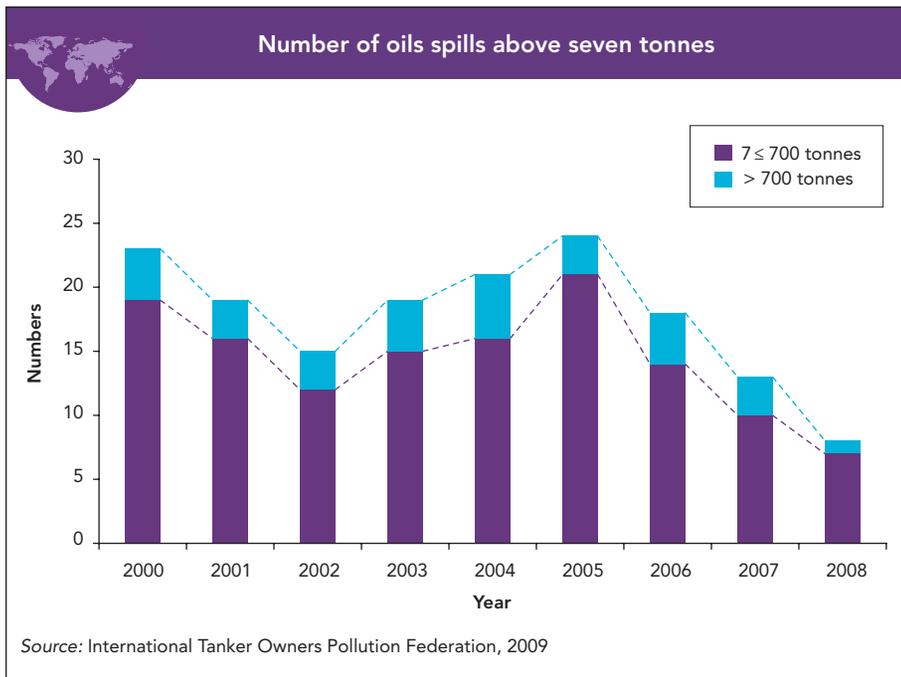
## Economic trends of shipping

The growth of shipping capacity corresponds to a period of rapid growth in world trade. Shipping costs have shown a steep decline, attributable in part to containerization, which has made long-distance trade more economical. The peaks of world production and world merchandise exports at the turn of the millennium translated into a continuous growth in the shipping fleet. However, as a consequence of the recent global crisis the decline in world production and world merchandise exports has led to significant surplus capacities in the shipping industry.

## Development of world trade and of world shipping fleet by millions of dwt (cargo carrying vessels of 100 GT and above)



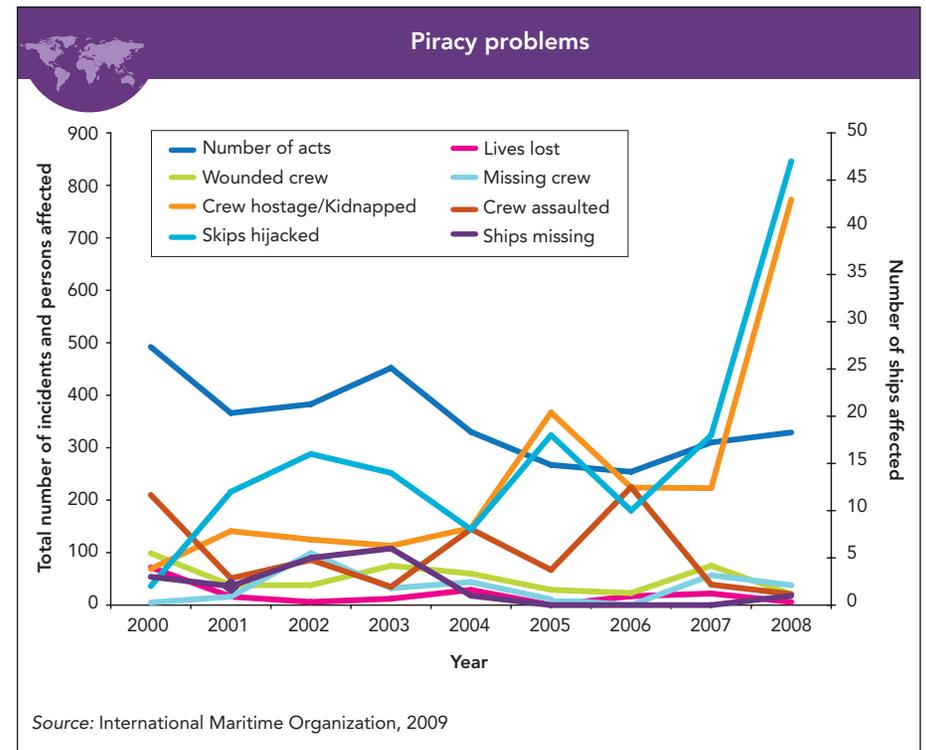
Source: International Maritime Organization, 2009; UNCTAD, 2008; World Trade Organization, 2008, 2009



The number of oil spills declined steadily throughout the last four years and the current trend may indicate better environmental safety measures implemented in the shipping industry, though declining trade may explain part.

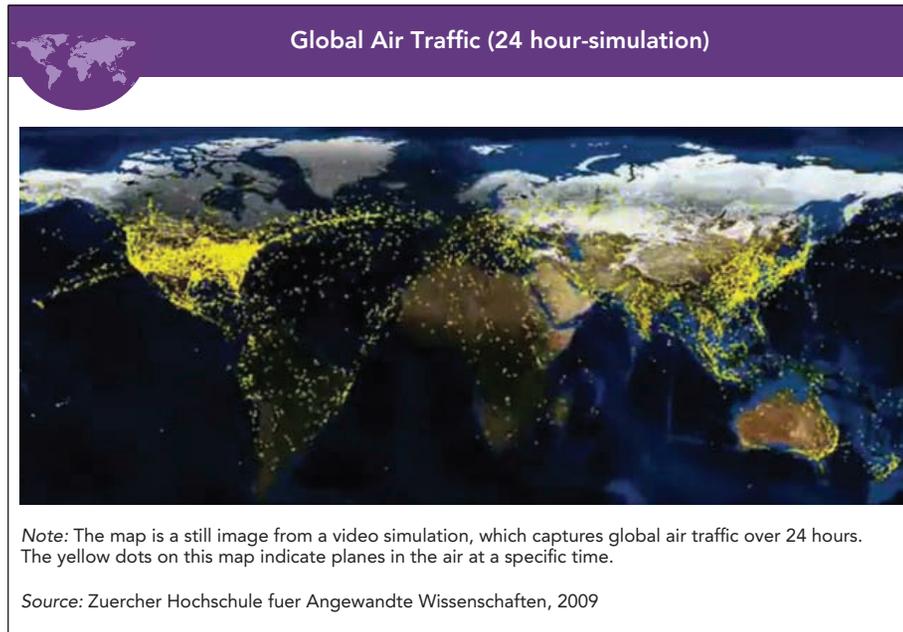
**The economic pressures on the shipping industry are compounded by rising piracy in important trade lanes. Although the total number of incidents declined in the last decade, the number of hijacked ships and hijacked crews rose significantly.**

Between 2003 and the end of 2008 a total of 1,845 actual or attempted acts of piracy were registered around the world which equates to an average annual rate of over 300 incidents. The direct economic cost of piracy in terms of fraud, stolen cargos and delayed trips is estimated at between 1 billion USD and 16 billion USD annually.<sup>38</sup> With average ransom settlements gradually increasing in the past twelve months, experts expect that the average ransom settlement may reach 3 million USD in 2010.<sup>39</sup>



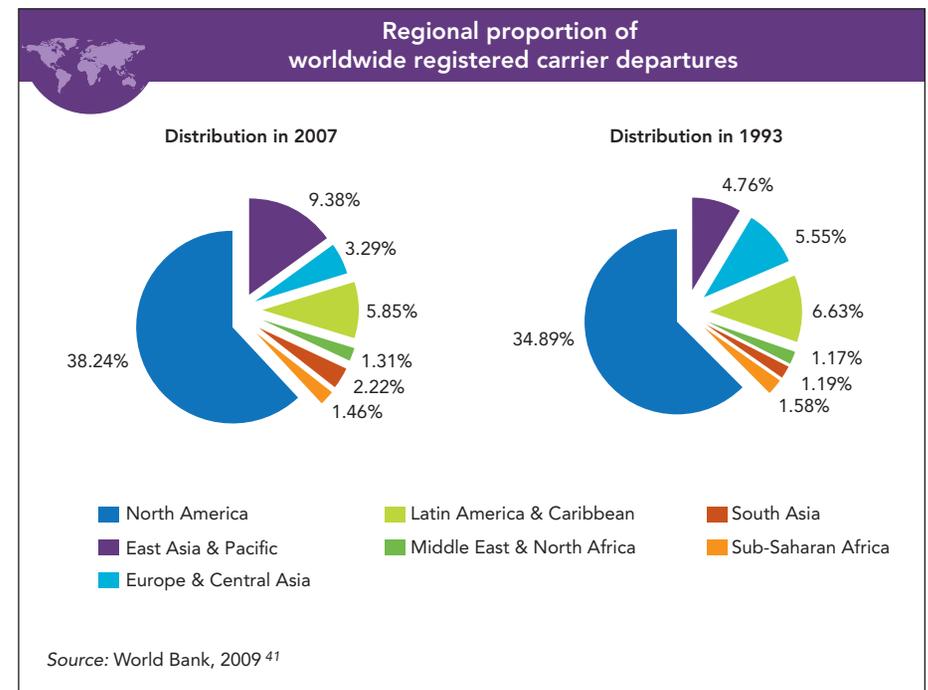
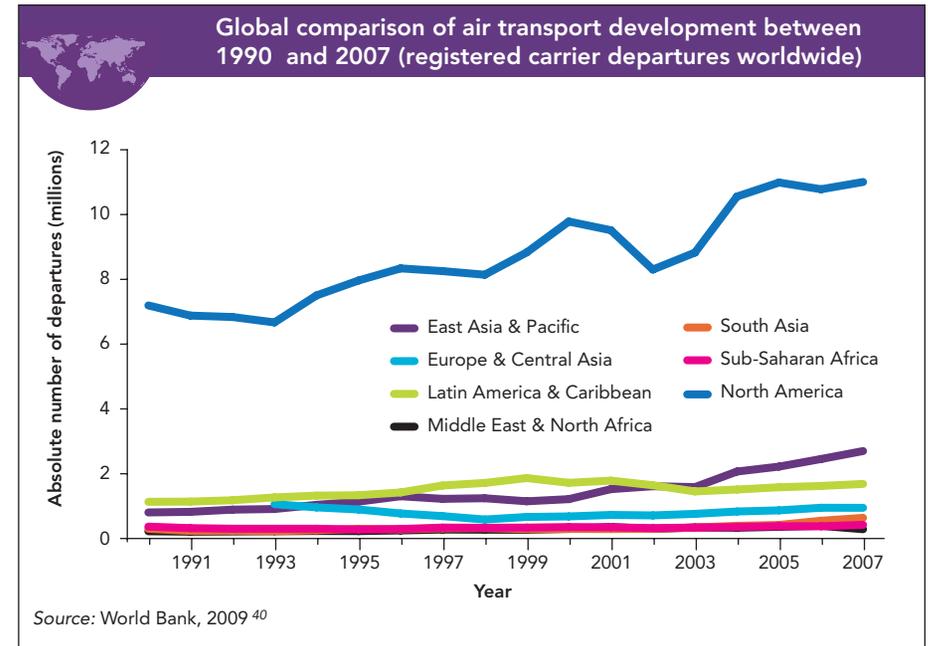
## Air Transport

Globally air traffic increased by over 60 per cent between 1990 and 2007 and the number of registered carrier departures rose by almost 70 per cent.



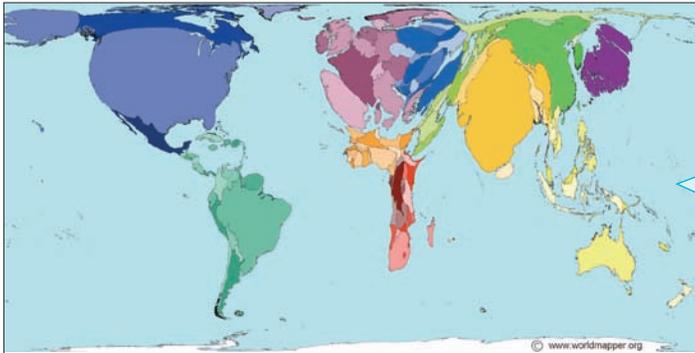
In 2007, more than one third (38 per cent) of the worldwide registered carrier departures originated in North America and almost 10 per cent in East Asia and the Pacific (includes China). Compared to 1993, the share of departures has decreased in Europe and Central Asia, as well as in Latin America and the Caribbean, whereas the shares of East Asia and the Pacific and South Asia have almost doubled.

Even though the country grouping "South Asia" contains India and despite its economic growth rates, the region accounts for only 2.22 per cent of the worldwide registered carrier departures in 2007, though in absolute numbers the departures have almost tripled since 1990. The absolute numbers of departures show that the base of reference is significantly different when comparing North America with other regions.



# Mapping the global proportions of transport dimensions

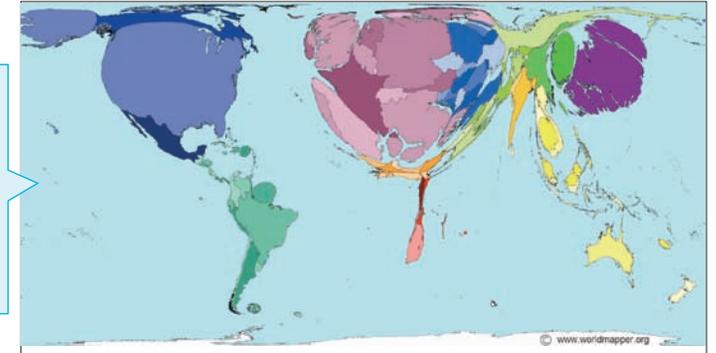
*(The country sizes reflect relative amounts of the respective variable)*



**Road Network<sup>42</sup>**

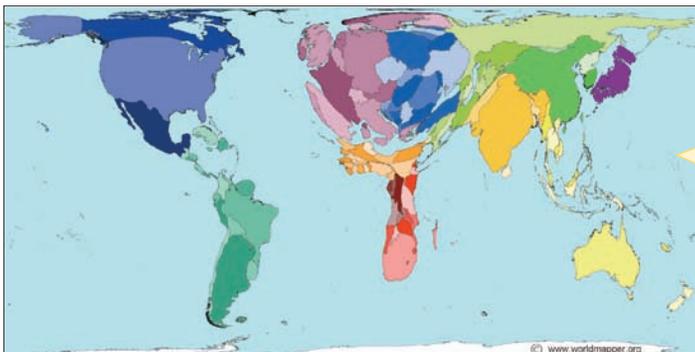
In 2007 there were about 33.2 million kilometres of road in the world. The highest road density (number of roads per square kilometer) can be found in Japan and the lowest in the Middle East.<sup>43</sup>

With rising incomes and consistent with increasing demand for passenger travel the need for roads and the demand for car ownership in countries such as China will increase.



**Passenger Cars<sup>44</sup>**

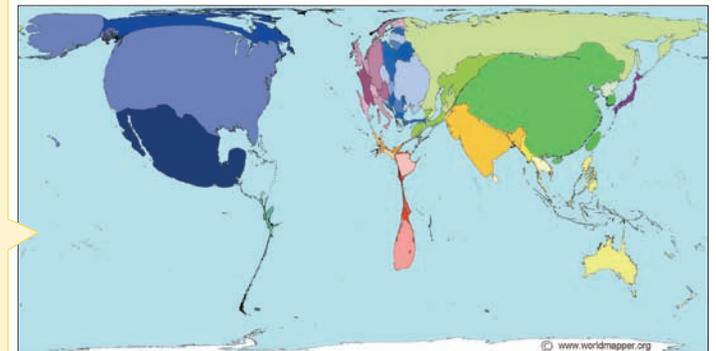
Developed countries dominate the list of countries with the most cars per 1,000 people, with New Zealand and Luxembourg at the top of this list. In contrast, car ownership in Africa and Asia is low.<sup>45</sup>



**Rail Network<sup>46</sup>**

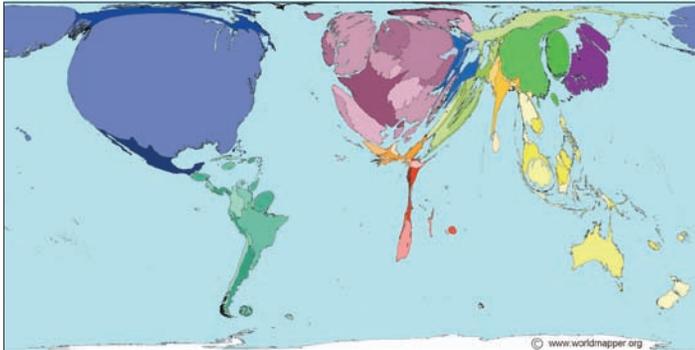
The global rail network consisted of approximately 1 million kilometers of railway in 2010. Net 56,912 km of rail were added to the global rail network in the years from 2000 to 2007.<sup>47</sup>

The development of the rail networks shows a diverging trend in the years between 2000 and 2007. Some countries have reduced the net amount of railway km: for example, Poland by 3,141 km, France by 3,027 km, Germany by 2,755 km and Russian Federation by 1,917 km. Other countries have expanded their railway network: for example, Spain added 966 km net, South Africa 1,860 km net, China 4,981 km net, Canada 27,216 net and the United States of America build net 31,949 km of rail. The changes will impact the amount of rail freight in the respective countries. Numerous countries, especially Small Island Developing States, have no railways at all.<sup>49</sup>



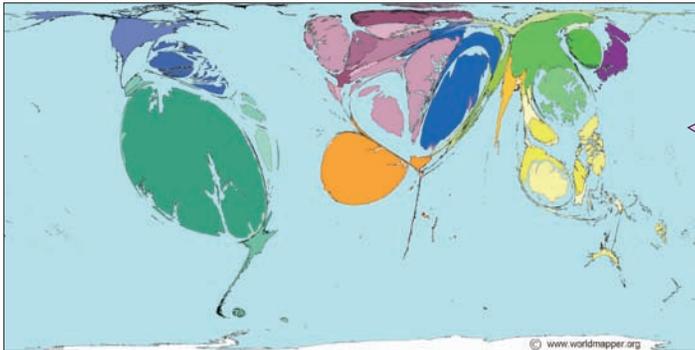
**Rail Freight<sup>48</sup>**

In 2007, 9.5 trillion metric tonne-kilometres of rail freight were carried. The largest total amount of rail freight carried is in the United States of America (2.8 trillion metric tonne-kilometers), Russian Federation and China (2.2 trillion metric tonne-kilometers).



### Air Freight<sup>50</sup>

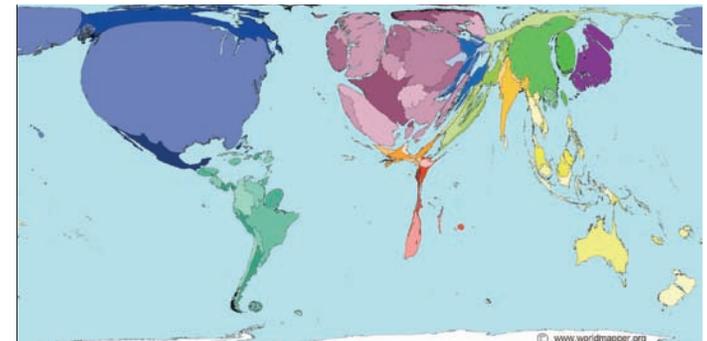
From 2001 to 2005 air freight transport grew steadily and reached 143,203 million tonnes-km in 2006. However, the data in 2007 with a decline to 124,628 million tonnes-km (87 per cent of the previous year) is consistent with the increase of freight transport by maritime transport means.<sup>51</sup>



### Cargo Shipping<sup>53</sup>

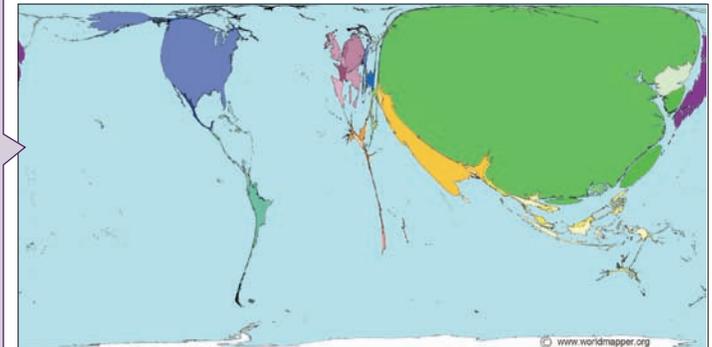
The map shows tonnage by the territory of registration. This map is very similar to that of oil tankers. Due to favourable legislation and tax reasons ("flags of convenience"), most ship registration by weight is in Panama and Liberia, followed by Malta and Cyprus.

Between 2007 and the beginning of 2008, the world merchant fleet expanded by 7.2 per cent to 1.12 billion deadweight tonnes (dwt). The year 2007 also witnessed a strong growth of liquefied natural gas carriers (+ 11.5 per cent) reflecting the growing use of LNG in global energy supply.<sup>56</sup> The addition of new capacity continues the reduction of the average age of the total world fleet to 11.8 years in 2007. Notably, developed countries have the youngest vessels (on average 10 years old in 2008) followed by developing countries (on average 13 years old) and the vessels in transition economies are on average 16 years old.<sup>57</sup> The above developments highlight the importance of addressing increasing maritime carbon dioxide emissions.



### Aircraft Departures<sup>52</sup>

Over 28 million civilian aircraft departures occur every year.



### Container Ports<sup>54</sup>

On average, global container port traffic grew annually by 11 per cent between 2000 and 2008. The main driving countries are China (average annual growth rate of 15 per cent), the United States of America (average annual growth rate of 5.8 per cent) and Singapore (average annual growth rate of 7.5 per cent). In absolute terms, China moved 2.5 times more containers (by capacity) than the US and almost 4 times more than Singapore.<sup>55</sup>