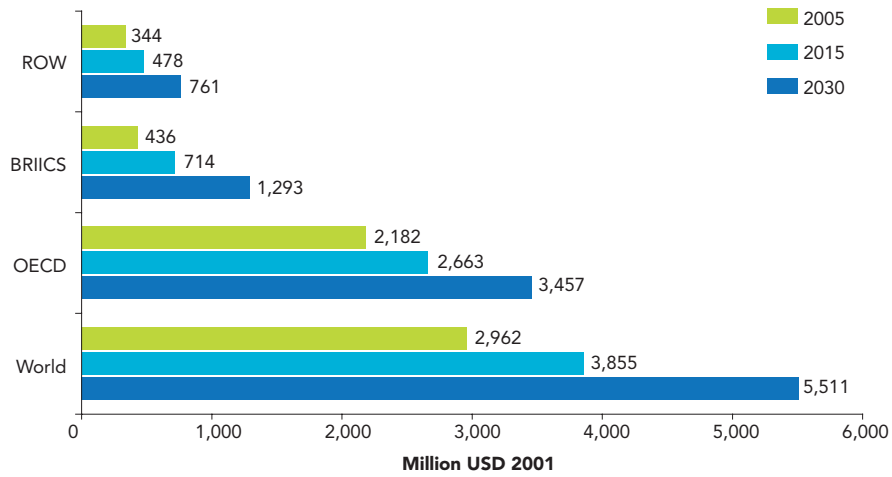
I. CHEMICALS

The consumption and production of chemicals in developing countries is growing much faster than in developed countries and could account for a third of global consumption by 2020.[1]

At the 2002 World Summit on Sustainable Development governments set the goal "that by the year 2020, chemicals will be produced and used in ways that minimize significant adverse impacts on the environment and human health" and called for implementation of the strategic approach to international chemicals management (SAICM).

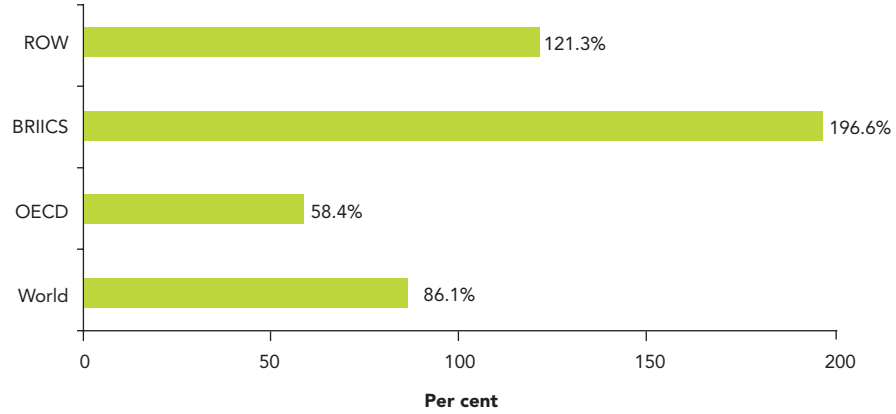
On current trends, developing countries are expected to account for 37 per cent of the production of high volume industrial chemicals by 2030. Since 1987 the chemicals sector in China has been growing at an annual rate of around 16.5 per cent, which is several times the rate of most OECD countries (around 1 to 4 per cent over the past 10 years). As a result, China has surpassed Germany as the third largest producer of chemicals.[2]

Projected chemicals production by region (2005-2030)



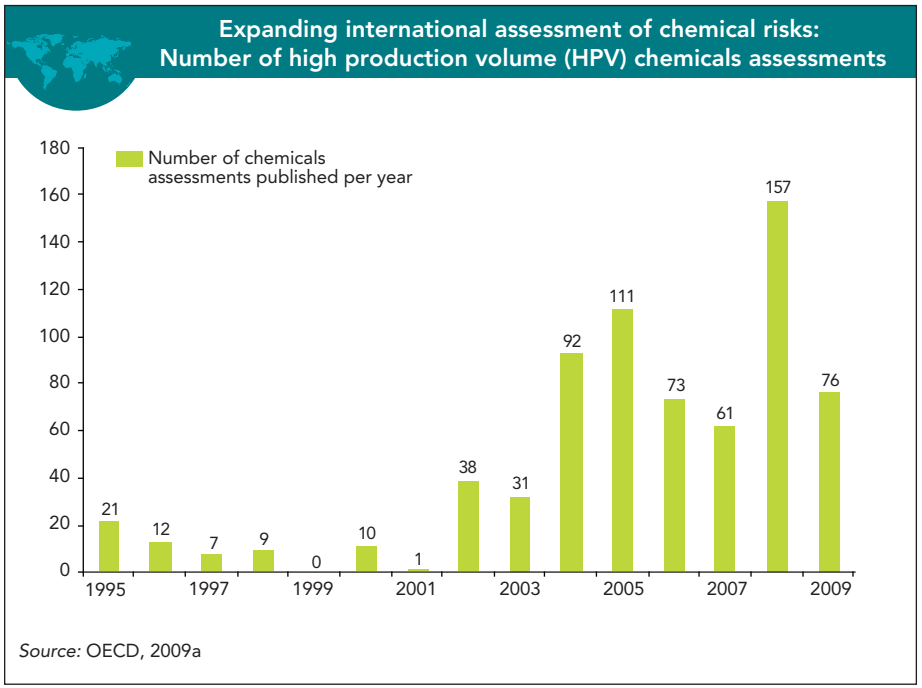
Source: OECD, 2008b [3]

Projected changes in chemicals production by region between 2005 and 2030: Total % change, 2005-2030



Source: OECD, 2008b

At the turn of the millennium international assessment of chemical risks was expanded and accelerated



Assessments of chemicals are a tool to increase sustainable chemistry efforts. However, the amount of new chemicals added to the database each day makes it very difficult to keep pace with sufficient and effective assessments. There is a need for more systematic data and impact assessment of chemicals production and consumption, in order to ensure that new technologies (e.g. nanotechnology, detergent enzymes, biocatalysts) reduce energy use and pollution without harming health and environment.[4]

Under the umbrella of sustainable development, "sustainable chemistry" refers to the design, manufacture and use of efficient, effective, safe and more environmentally benign chemical products and development processes. [5]

Within the framework of sustainable chemistry, the OECD carries out co-operative initial hazard assessments to determine the need for further work. Since the programme began, some 949 chemicals were assessed (including 8 which have been re-assessed) and the results published. Between 1993 (first meeting) and 2002 (WSSD), 260 chemical assessments were carried out, while between 2002 and 2009 (April meeting) 689 chemicals were assessed.

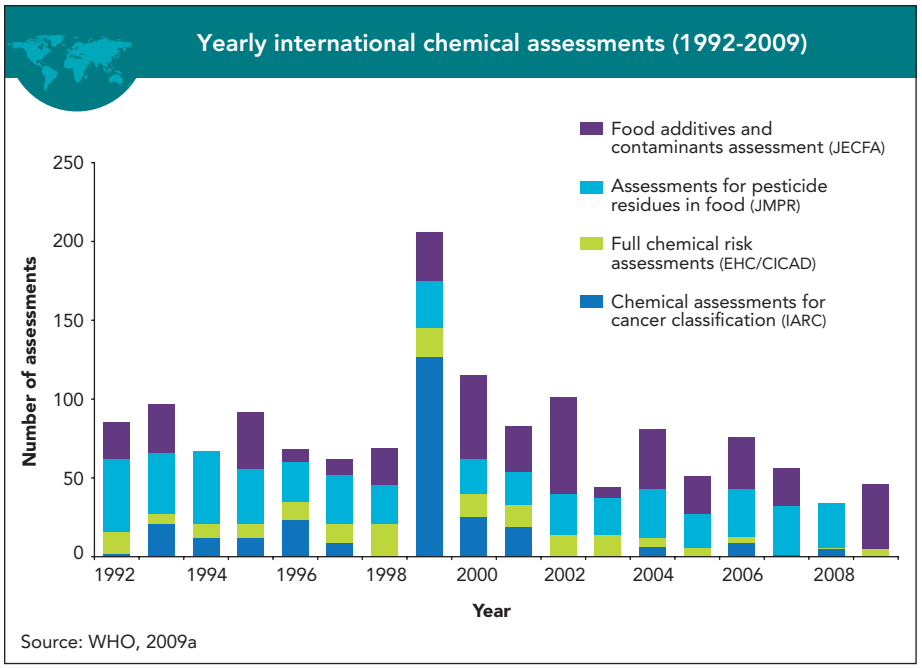
The average annual number of chemicals assessments undertaken from 2001 to 2009 compared to the average number of assessments between 1995 and 2000 has multiplied by seven.

Such an increase is due to the availability of more funds for the assessments and a stronger commitment of the countries to conduct initial hazard assessments of high production volume (HPV) chemicals (those produced or imported in excess of 1,000 tonnes per year in at least one country or region).

Expanding international assessment of chemical risks: Number of high production volume (HPV) chemicals assessments

"More than 25 per cent of the global burden of disease is linked to environmental factors, including chemicals exposures. For example, about 800,000 children each year are affected by lead exposure, leading to lower intelligence quotients. The highest exposure levels occur predominantly in children in developing countries. Worldwide, lead exposure also accounts for 2 per cent of the ischaemic heart disease burden and 3 per cent of the cerebrovascular disease burden. Artisanal gold mining in developing countries remains a significant cause of mercury exposure, while mercury-containing medical instruments such as thermometers and sphygmanometers are a continuing source of exposure in both developed and developing countries. Some 9 per cent of the global disease burden of lung cancer is attributed to occupation and 5 per cent to outdoor air pollution. Cancer of the lung and mesothelioma are caused by exposure to asbestos, which remains in use in some countries. Unintentional poisonings kill an estimated 355,000 people each year. In developing countries, where two thirds of these deaths occur, such poisonings are associated strongly with excessive exposure to, and inappropriate use of, toxic chemicals, including pesticides.

Source: WHO, 2009b

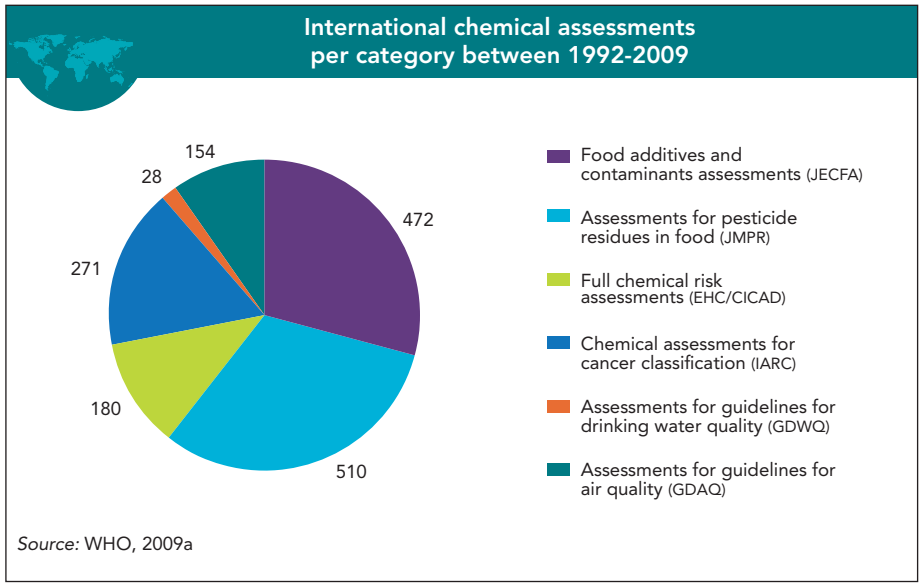


Chemicals assessments provide a consensus scientific description of the risks of chemical exposures, which are then published in assessment reports and other related documents so that governments, international and national organizations and other stakeholders can use them as the basis for taking preventive actions against adverse health and environmental impacts.

According to the WHO, the assessment documents are often used as the basis for establishing guidelines and standards for the use of chemicals and for standards for drinking water and can assist with the implementation of international agreements such as the Globally Harmonized System of Classification and Labelling of Chemicals (the GHS).[6]

"The sound management of chemicals is essential if we are to achieve sustainable development, including the eradication of poverty and disease, the improvement of human health and the environment and the elevation of the standard of living in countries at all levels of development."

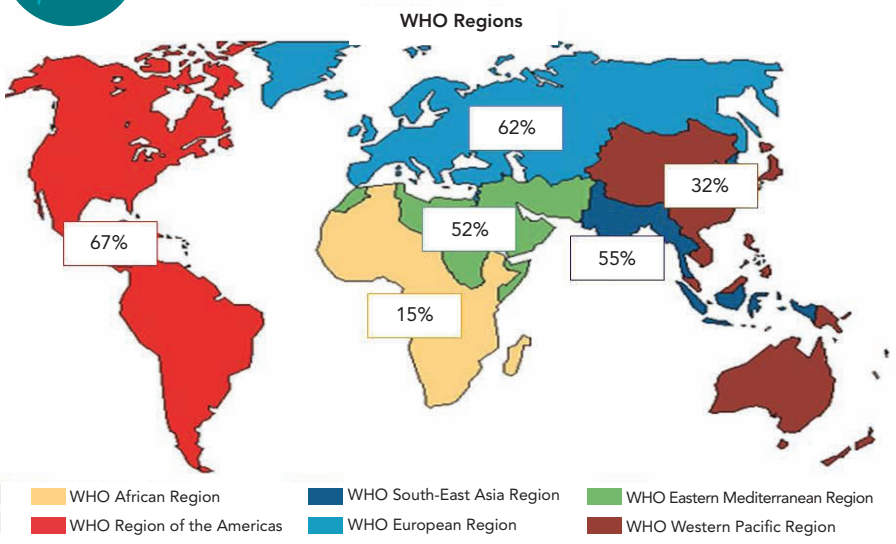
— Dubai Declaration on International Chemicals Management February 2006



In 2009 the country coverage of poison centres was substantially lower in Africa and the Western Pacific than in the rest of the world.

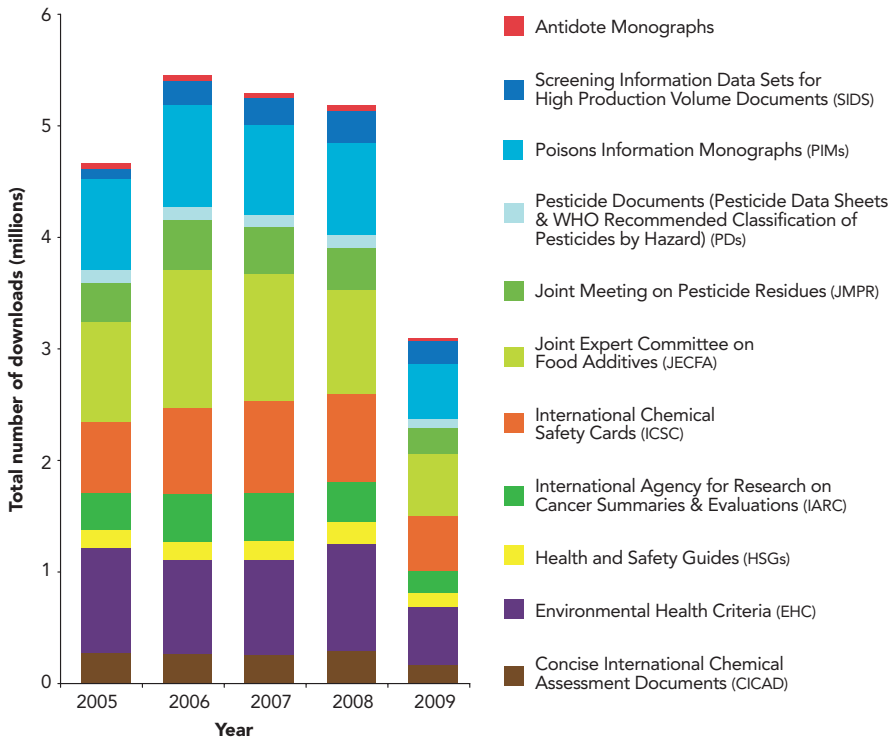
The map illustrates the proportion of countries per WHO region that have at least one poison centre. The main role of the poison centres is to provide advice to members of the public and health care professionals about acute poisoning situations. They also act as a source of information for authorities and the media whenever necessary. The growing number of chemicals will most likely increase the need for poison centres.

Countries with at least one Poison Centre per WHO region



Source: WHO, 2009a

INCHEM Statistics from January 2005 to August 2009

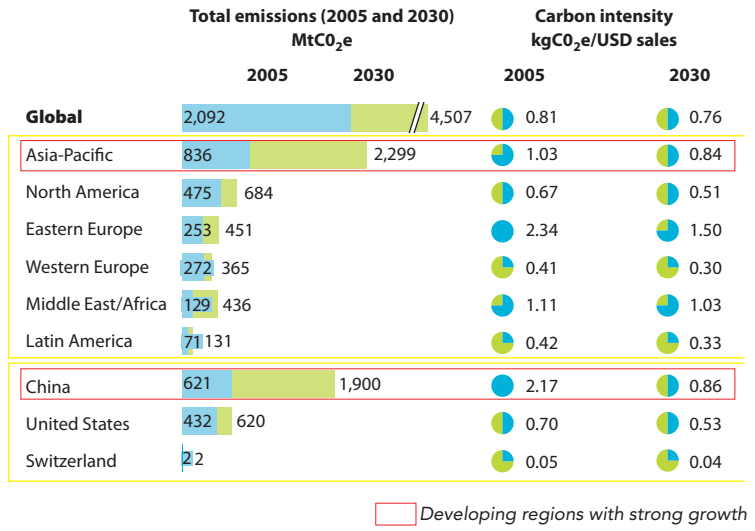


Source: WHO, 2009a

The International Programme on Chemical Safety's (IPCS) database INCHEM offers electronic access to thousands of searchable full-text documents on chemical risks and the sound management of chemicals, helping countries fulfill their commitments under UNCED's Agenda 21, Chapter 19. INCHEM consolidates information from a number of intergovernmental organizations whose goal is to assist in the sound management of chemicals.

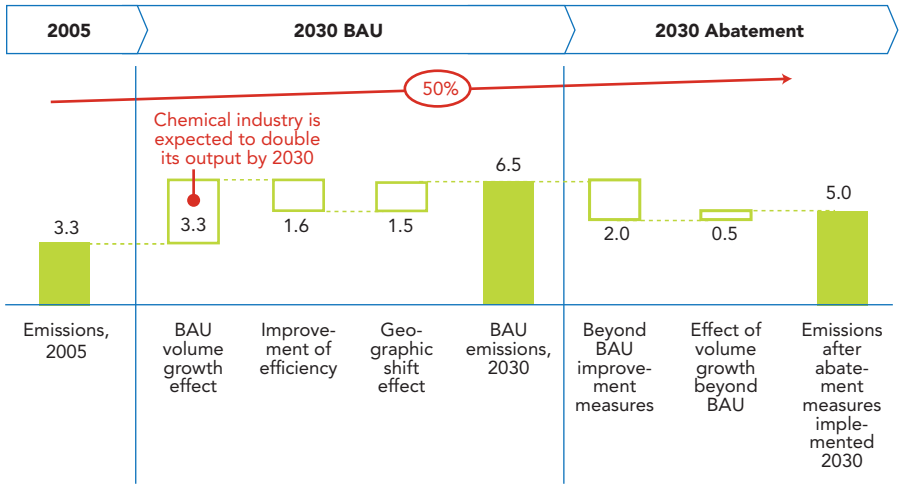
The number of searches done from the INCHEM database reached its peak in 2006 but has since gradually decreased. The most searched topics have been the Joint Expert Committee on Food Additives[7], Environmental Health Criteria and Poisons Information Monographs[8].

Regional comparison of chemical industry CO_2 emissions intensity (in 2005 and scenario for 2030)



Source: International Council of Chemicals Associations, 2009 [9]

Evolution of the chemicals industry emissions in the BAU scenario and abatement scenario



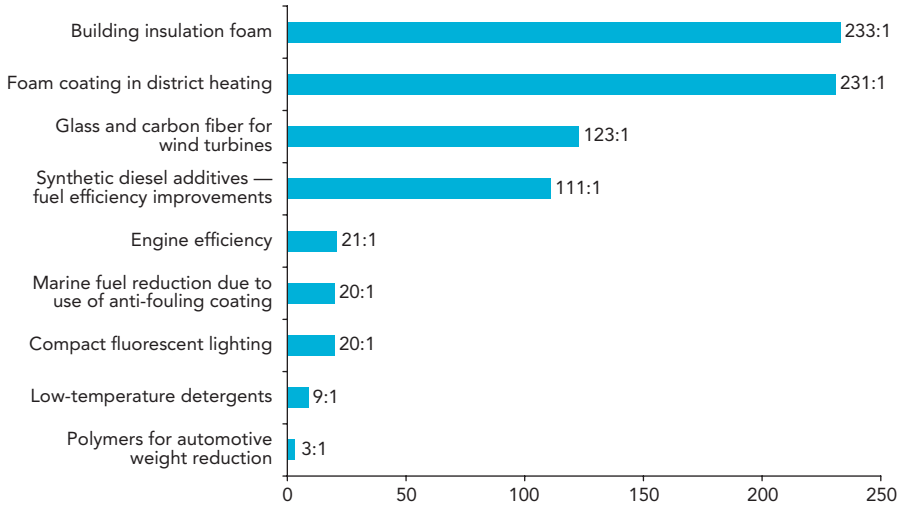
Source: International Council of Chemicals Associations, 2009 [10]

Chemicals — being an ingredient in nearly every man-made material — are an important contributor to lowering energy use and greenhouse gas emissions, for example through improved insulation materials and low-temperature detergents, to name a few.

At the same time, the chemical industry is a carbon-intensive industry. The 2030 scenario presented here shows how the chemical's industry emissions could be expected to evolve under business-as-usual, and also the abatement it enables in other industries and by end users.

The chemical industries in Asia-Pacific, Middle East/Africa and Eastern Europe are relatively carbon-intensive. Volume growth, efficiency gains and geographic shift are the most important drivers in this BAU scenario. An overview of the evolution of chemicals industry emissions shows that the drivers result in an increase of the CO_2 emissions from 3.3 Gt +/- 25 per cent (in 2005) to approximately 6.5 Gt +/- 35 per cent (in 2030) in a business-as-usual scenario, with potential to reduce emissions to 5 $GtCO_2e$ +/- 35 per cent if abatement measures are implemented.

Examples of the GHG emissions savings enabled by chemistry include (ratio of emissions savings to emissions)



Source: Based on data from International Council of Chemicals Associations, 2008 [11]

The graph summarizes the ratio of greenhouse gas emission savings in several categories to emissions produced in making the chemicals/materials. The study from which it is taken[11] found that significant emissions savings by volume come from improving building insulation materials, fuel additives, improved wind turbines, compact fluorescent lighting, marine antifouling coatings, synthetic textiles, automotive plastics, low-temperature detergents, engine efficiency, and insulation used in piping. Substituting materials and building components would be required to increase the impact of chemicals on greenhouse gas emission savings.

"Hundreds of millions of tiny plastic pellets, or nurdles — the raw materials for the plastic industry — are lost or spilled every year, working their way into the sea. These pollutants act as chemical sponges attracting man-made chemicals such as hydrocarbons and the pesticide DDT. They then enter the food chain. 'What goes into the ocean goes into these animals and onto your dinner plate. It's that simple.'"

— *Kathy Marks & Daniel Howden, "The World's Dump"* The Independent *UK, 6 Feb 2008*