Chemistry and economic value creation

Because the chemical industry is "cross-linking" in nearly every application, it helps drive innovation across the entire economic system. In addition, chemistry's innovative products help the economy function more smoothly.

In our highly industrialized world, the chemical industry provides important research- and development-intensive intermediate products that enhance value in all customer businesses. New developments in chemistry have major impacts on other areas. The chemical industry has a larger spectrum of industrial customers than any other sector; some 80% of chemical products go as intermediates to other industries.

Food: fertilizers return to the soil what was removed at the harvest; higher yields per acre or hectare either conserve land or feed more people. Plant protection, which prevents crops from spoiling, has a similar function.

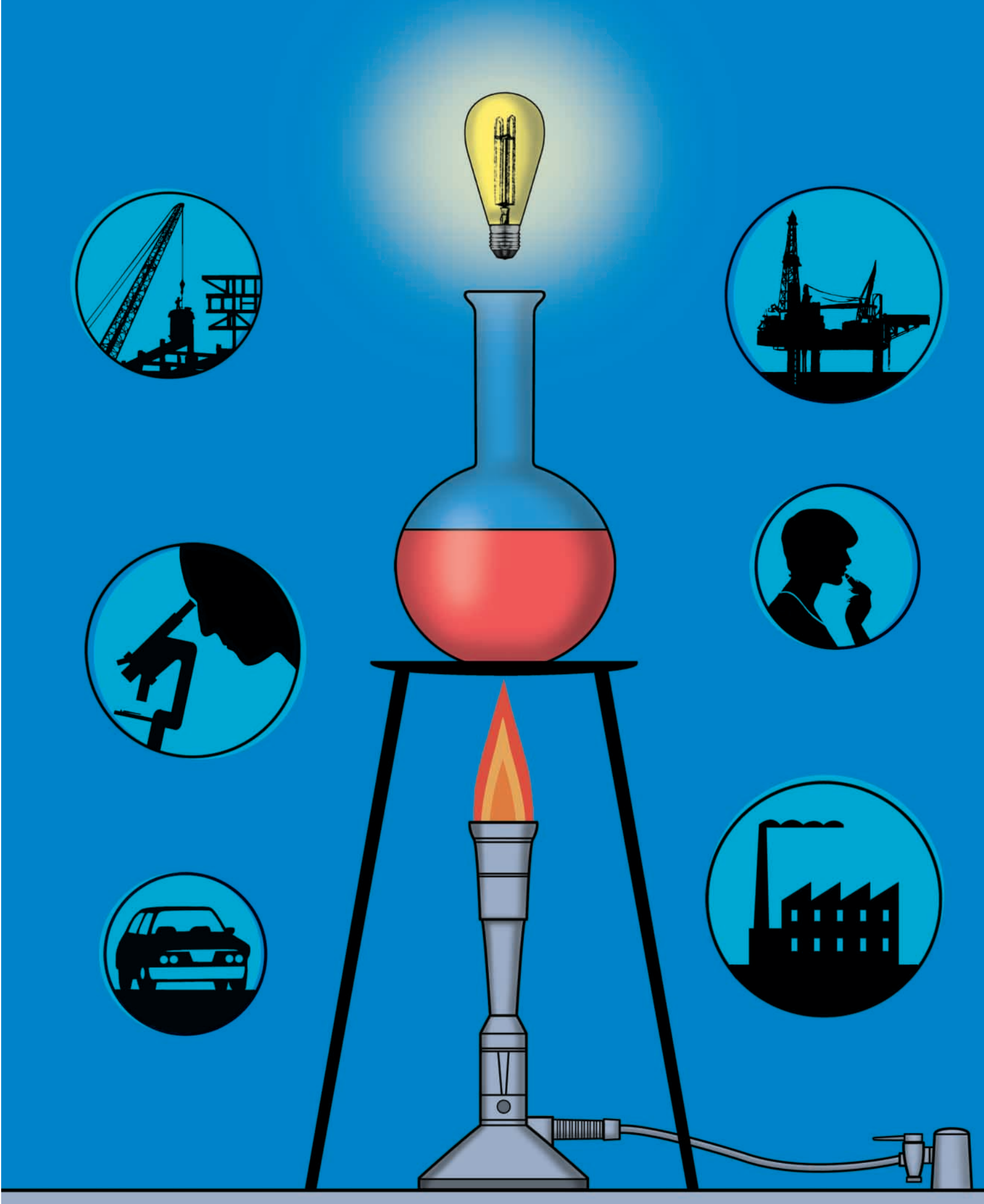
Some 80% of chemical products are sold as intermediates to other industries.

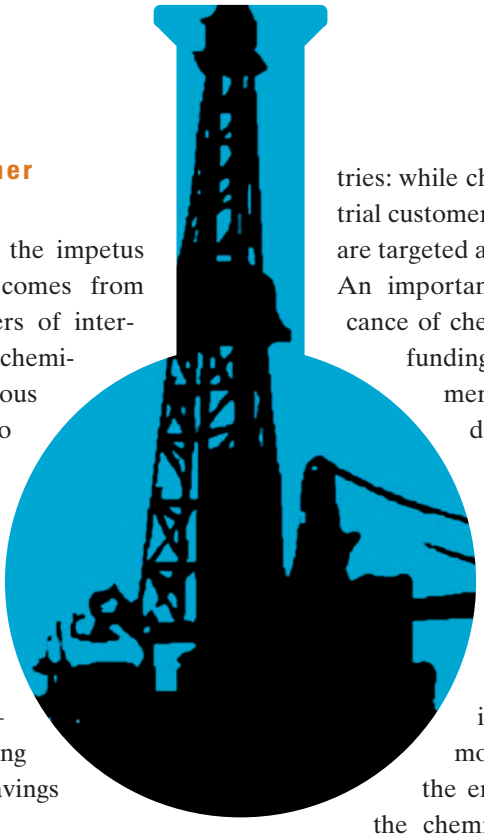
Clothing: synthetic fibers can be adapted to meet special needs, e.g. for robust carpets and upholstery or stretchable sportswear. Even cotton, a natural fiber, could not be manufactured economically without the use of chemical technology. And this also is the case for leather and paper production.

Living: chemistry plays many roles in the construction industry and the home. Energy-saving insulation, paints and coatings, anticorrosion agents, wood preservation and plastics that are lightweight, sturdy and reasonably priced are used by professionals in the building industry and by do-it-yourselfers at home. There are few mechanical or electrical appliances that do not contain materials made by using either chemicals or chemistry.

Mobility: chemistry has made a major contribution to automobiles. One need think only of airbags, seatbelts, tires, upholstery, lining, paints, antifreeze – and the list goes on and on. Even the combustion in an engine's cylinders is the subject of chemical research; chemical additives are used to help give materials there a longer life. And the catalytic converter is, to a great extent, a chemical product.

Health: by making synthetic drugs possible, chemistry has made medicine much more affordable and economic. Moreover, it has enabled research on the body's biochemistry that otherwise would be impossible. Doctors use chemistry to derive important information about metabolic processes. And thanks to chemical analysis, they can diagnose illnesses and plan treatments to bring patients back to health.





Chemistry's path to other industries

In an integrated economy, the impetus for new products often comes from customers or from suppliers of intermediates. As a supplier, the chemical industry gives tremendous new-product momentum to its customers. Moreover, chemistry supplies the know-how for many process innovations: about one in every ten euros saved by process improvements can be credited to chemical innovation – only mechanical engineering novelties provides more savings to customer industries.

Because chemicals are supplied to free markets that are subject to strong price pressure, sinking manufacturing costs are the rule. This is a blessing for buyers of chemicals, and at the same time an excellent driver of innovation, because it promotes faster penetration of new applications and new products. Price decreases in chemicals encourage product innovations elsewhere.

Many people see chemicals only as pollutants, but in fact, chemical innovations also help make the environment cleaner. They can reduce energy consumption, improve recycling or avoid environment burdens. All this leads to more value creation.

Innovations in the chemical industry help to reduce environmental impacts.

Although most chemical products are used as intermediates in production processes of other industries, chemistry plays a minor role when it comes to services. This is the major difference between the chemical and pharmaceutical industries: while chemistry is geared to industrial customers, pharmaceutical products are targeted at consumers.

An important measure of the significance of chemistry in innovation is the funding of research and development (R&D). The chemical industry is responsible for some 20% of all R&D expenditure for all industries in Western Europe. R&D progress is transferred indirectly to other sectors, and because the circle of customers of the chemical industry is broader than almost any other, this benefits the entire economy. Put simply: the chemical industry lends its research luster to many research-poor sectors.

New machines and advances in data processing primarily lead to more rational production processes and higher product quality. By contrast, chemical innovations mainly provide sparks for new products.

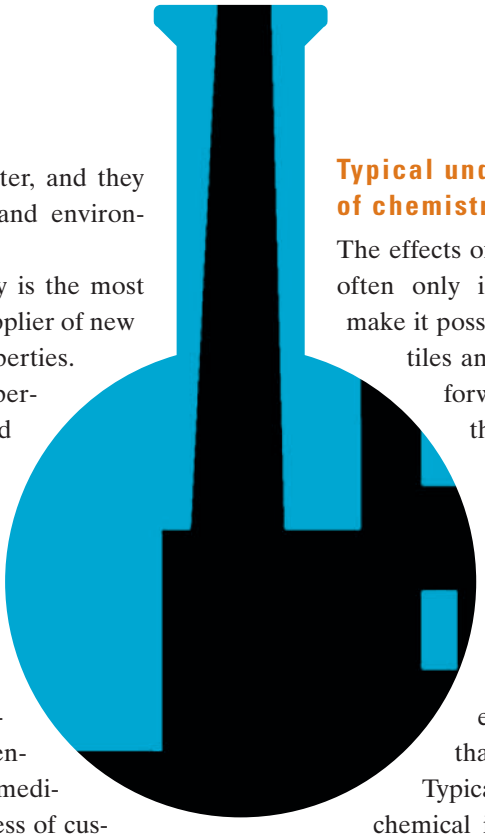
For plastics processing, pharmaceuticals and textiles, the chemical industry is by far the most important supplier, although its products normally end up in these industries via a detour. The chemical industry supplies around 5% of its production output directly to the automobile industry, while another 5% is used indirectly for plastics for electronics and interior fittings or chemical fibers for fabric coverings, seatbelts, and airbags.

Chemical innovations can be passed on to other industries via three different channels: new materials for new products, new materials for process innovations, and products that reduce the cost of intermediates.

New materials lead to product innovations with new functionalities and improved performance. They make investment products (computers, machines) and consumer goods (mobile phones, consumer electronics, cars, sports articles) more

durable, long-lived and lighter, and they cut resource consumption and environmental burdens.

Today the chemical industry is the most important developer and supplier of new materials with improved properties. Chemicals enhance the performance of materials, extend application possibilities, increase durability or make more products recyclable. For customers, that means lower manufacturing costs and higher productivity. Innovations in chemistry make it possible to manufacture materials less expensively. Lower costs for intermediates boost the competitiveness of customer industries and result in favorable prices for novel products made by chemical industry customers.



Innovation users or innovation drivers?

The major role of chemistry is to concentrate on innovative products that manufacturers supply to other companies. Chemistry is responsible for up to 20% of the turnover achieved by manufacturers from innovative products. That's more impetus for innovation than in any other branch of industry, and that is also more novelties than any other branch of industry.

Since the chemical industry is normally at the beginning of the value-creation chain, chemical companies rarely acquire innovations from other industries. One main reason is that industries at the beginning of the chain – with the exception of chemical plant design – are not technology producers themselves. As a producer of intermediates, the chemical industry has fewer possibilities than industries at the end of the chain to give impetus to innovations related to its own demand or to require them as a customer.

Typical undervaluation of chemistry

The effects of chemical innovations are often only indirect. New fibers that make it possible to produce better textiles and thus, for example, drive forward new applications in the automobile industry, are viewed by car manufacturers and end customers as textile industry products and not attributed to the chemical industry. Furthermore, innovation from suppliers is considered less important than that from customers.

Typically, users do not regard chemical innovations as being very exclusive. New materials and substances are available immediately to all customers. Tailor-made products, such as those used in the machinery industry, hardly exist in the chemical industry. Consequently, buyers of chemical products often do not give the chemistry adequate credit for its innovations.

Chemical innovations typically are not held exclusively by a single user.

TEXT AND ILLUSTRATION

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