

CATALYSIS HELPS SOCIETY DO MORE WITH LESS



Innovative Process Improves Sustainability, Quality of Life

Catalysis is a powerful technology with vast potential to help address global challenges. It will play a crucial role in efforts to improve energy efficiency, reduce greenhouse gas emissions, feed a growing population, and improve health and living standards. Given its important benefits, support for catalysis should be a priority for governments, industry, and researchers.

WHAT IS CATALYSIS?

In many ways, catalysis makes modern living possible, with valuable contributions in areas such as transportation, energy, food production, and health.

WITHOUT CATALYST



WITH CATALYST



Catalysts are added substances that increase the rate of chemical reactions. Less energy is used per unit of product.

CATALYSIS BENEFITS FOR SOCIETY



Some laundry detergents contain enzymes that let them work in cold water – that's catalysis!



Catalytic converters in cars have dramatically reduced harmful emissions.



Catalysis contributes to greater than 35% of global GDP, estimates show.



Human cells contain enzymes that make biochemical reactions happen more than a million times faster.



Catalysis is important for the production of chemicals, pharmaceuticals, energy, and agriculture.



15 Nobel Prizes have been related to catalysis.

ACTIONS NEEDED TO REALIZE FUTURE GAINS

About 90% of chemical processes already use catalysis for efficient production, but there is enormous potential for further energy savings in the chemical industry.* Advancements are possible in the areas of feedstocks, fuels, and production of some high-volume chemicals. Developing “next generation” catalytic processes will require a dedicated effort over many years.

KEY STEPS

- 1 Expand adoption of best practice technologies
- 2 Commit to ongoing investment in research and development
- 3 Create a policy framework that supports development, demonstration, and deployment
- 4 Encourage collaboration by industry, universities, and government



Energy savings could reach 13 exajoules by 2050 – equivalent to the annual energy consumption of Germany.



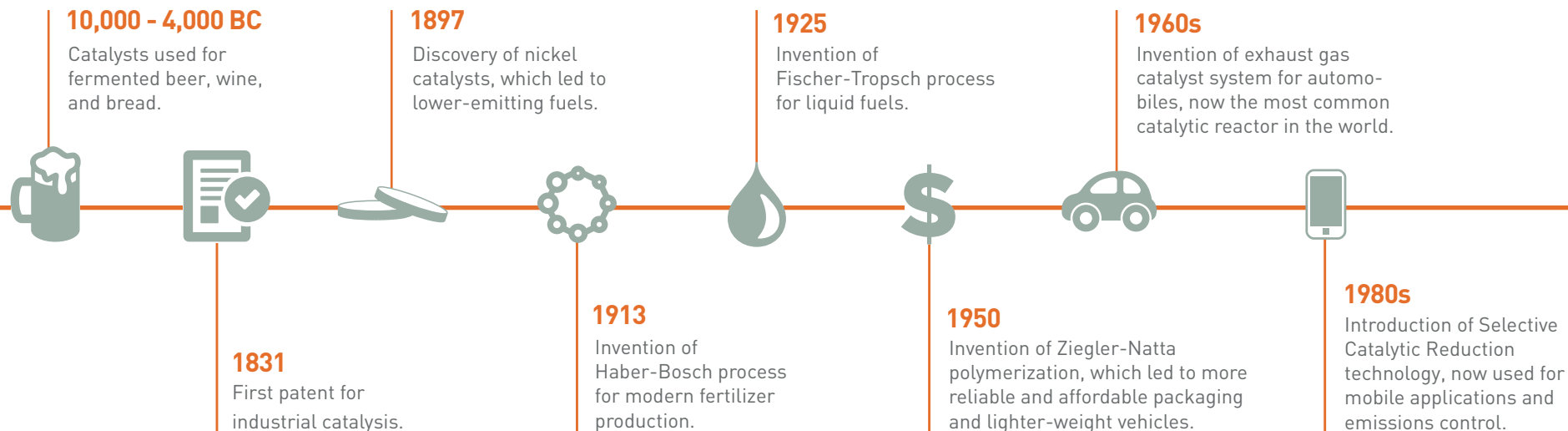
GHG emissions could be reduced by 1.1 billion tons of CO₂ equivalent – equal to the annual emissions from 200 million vehicles.



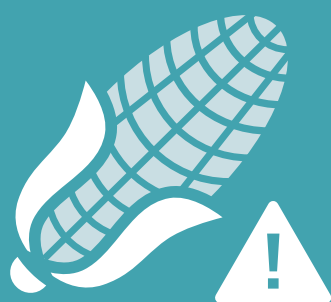
Operating costs could be lowered – helping manufacturers to be more competitive.

* International Council of Chemical Associations (ICCA), International Energy Agency (IEA), and Society for Chemical Engineering and Biotechnology (DECHEMA), “Technology Roadmap: Energy and GHG Reductions in the Chemical Industry via Catalytic Processes,” 2013 <http://www.americanchemistry.com/Catalysis-Roadmap>

TIMELINE OF INNOVATION



CASE STUDY: MODERN FERTILIZERS



In the 1920s, Europe faced a potential food crisis due to depleted soils.



A new catalyst for ammonia production cut energy used by 60%. The lower-cost fertilizers helped avert the crisis, and the "Haber-Bosch" process became the cornerstone of modern fertilizer making.



Today, about 50% of the world's food production relies on ammonia-based fertilizers.