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### Participating Schools

Michigan Technological University  
Mississippi State University  
Ohio State University  
Pennsylvania State University  
Rose-Hulman Institute of Technology  
San Diego State University  
Texas Tech University  
University of Akron  
University of California, Davis  
University of Michigan  
University of Tennessee  
University of Texas at Austin  
University of Tulsa  
University of Waterloo  
University of Wisconsin — Madison  
Virginia Tech  
West Virginia University

## Background

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Over the past decade, as American consumers have tended to purchase family-sized vehicles that offer more utility, there has been a simultaneous demand to reduce energy consumption and vehicle emissions. During this time, the automotive industry, U.S. government, and academia have been working together through a series of special competition programs to develop and explore advanced technologies to address these important energy and environmental issues, and lead to sustainable vehicle solutions.

Previous competition programs have challenged thousands of engineering students across the United States and Canada to achieve better fuel economy and lower emissions while maintaining the safety, performance, utility and consumer appeal of a variety of vehicles. The U.S. Department of Energy (DOE) and key industry sponsors led by General Motors Corporation (GM) have expanded that concept and developed a new competition series that launched in 2004. The new competition series differs from previous programs by following a vehicle development process that is used in industry, teaching students the real-world process and better equipping them with the tools they need to fully realize their vehicle designs.

## Challenge X: Crossover to Sustainable Mobility

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The U.S. Department of Energy and General Motors have teamed up with other sponsors to challenge the best and brightest engineering students from universities throughout North America in the competition series, Challenge X: Crossover to Sustainable Mobility. The 2007-2008 academic year is the fourth year of the program and is the final year students will be working on their vehicles as well as developing a plan on how best to market their vehicles to consumers.

Seventeen university teams from the United States and Canada are following a hands-on, real-world engineering process, based on GM's three-year Global Vehicle Design Process. By applying proven methods for engineering successful prototype vehicles, the program aims to teach real-world engineering skills to students that will make them highly valuable to the automotive community.

Students are working on a 2005 Chevrolet Equinox – a GM crossover sport utility vehicle platform –integrating cutting-edge advanced automotive technologies and alternative fuels, such as hydrogen, ethanol, and biodiesel, to minimize total environmental impact and build a sustainable transportation future.



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## Competition Details

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Year One of Challenge X emphasized vehicle simulation, powertrain testing, and engineering trade-offs that occur in the early stages of vehicle design. The students were challenged to do intensive modeling, simulation and testing to guide their hardware development – a key phase of the GM Vehicle Development Process. At the end of Year One each team received an identical stock 2005 Chevrolet Equinox. The powertrain designs developed in the first year were installed into vehicles in the second year of competition, giving the teams a head start on the vehicle integration process as they bring their designs to life.

Years Two and Three of Challenge X focused on the second and third key phases of the vehicle development process – vehicle integration and full vehicle development. In Years Two and Three, each university team integrated and refined their advanced powertrain and other vehicle subsystems into their Equinox. Year Two and Three focused on powertrain development and demonstration of the energy use and emissions goals of the competition. Team vehicles were judged extensively in on-the-road categories and were required to give technical presentations and submit an SAE-style technical paper.

Based on the success of the program, GM and the Department of Energy extended the Challenge X program for an additional year. The fourth year will give students the opportunity to further implement innovative technologies in their vehicles, such as telematics, that will help meet consumer demands for safety, security and convenience. The final year will also allow teams to focus on developing and implementing marketing plans for their vehicles to promote the goals of the Challenge X program.

## Participants & Sponsors

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A selection process open to all accredited engineering schools in the United States and Canada began in September 2003, and 17 teams were selected in February 2004. Challenge X participants were announced in the spring of 2004.

The U.S. Department of Energy and General Motors are the headline sponsors for the Challenge X competition; Argonne National Laboratory, a Department of Energy R&D facility, will provide competition management, team evaluation and technical and logistical support. More than 30 industry sponsors provide participating teams with leading-edge math simulation software, automotive propulsion systems, fuels,



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emissions-control technologies, fuel cells and other tools and technologies to compete in the program; they also provide mentoring support to the students.

Since the competition began in 2004, program sponsors have hired approximately 40 Challenge X students to join their staffs.

#### Contacts

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