



Challenge X 2007 Final Media Coverage Report

August 21, 2007





Table of Contents

Section 1: Overview, Observations & Recommendations	Page	3
Section 2: U.S. and Canada Media Tracking Report	Page	8
Section 3: Selected Quotes	Page	19
Section 4: Select Print and Online Clips	Page	21
Appendix 1: Complete Print Clips (includes hard copy clips)		
Appendix 2: Complete Online Clips (includes hard copy clips)		



SECTION 1

Overview, Observations & Recommendation



2006 – 2007 Media Review

The media strategy for the third year of Challenge X included the following elements: opportunistic media pitching throughout the year; targeted pitching to Austin media surrounding the Winter Workshop; reaching out to national, trade, specialty publication and Michigan-based media around the time of the June competition; and continued efforts as part of the Outreach Program to reach audiences at the local level in the 17 team home markets.

The following report represents a comprehensive look at the public relations effort for the third year of Challenge X, which focused on two main events: the Winter Workshop and ride and drive in Austin, and the June competition and media event in Michigan. As with past years, media outreach efforts for the year-end event included team pitching at the local level as part of the Outreach Program; sponsor pitching to promote their own involvement in the Challenge X competition; publicizing a Media Day event at GM's World Headquarters in Detroit; conducting a radio tour with the 17 teams; and posting video news releases (VNRs) at the end of the competition – one to reach local broadcast and electronic outlets and one to reach national and online outlets.

Our estimate for total print and broadcast audience reach for Year Three of Challenge X is a minimum of 23.2 million impressions, not including a very sizeable online reach of 214 million during the competition plus 99 unique online stories captured over the year. It is critical to note that this is a very conservative estimate, as audience figures for many of the team clips, radio interviews and online coverage – which was significant for the year – are unavailable. A table summarizing coverage and audience reach in detail appears later in this report; select print and online clips follow in section 4, and all available clips are as appendices in the hard copy version of this report. Also of note, this audience figure does not yet include numbers for the remaining anticipated coverage for this year's efforts.

Finally, the Challenge X website on GM's site received 2024 visits during the competition; online outreach from the competition reached an estimated audience of 214 million. More than 125 external websites carried the Challenge X information.

Local Outreach Programs

The Outreach Program continued to be a successful addition to our overall PR strategy, and was an effective way to garner localized community interest and media coverage of individual teams and their collective efforts as part of the Challenge X program. This year, 14 of the 17 teams officially made presentations to compete for outreach program awards at the 2007 competition. Further, all 17 teams made a concerted effort during the academic year to participate in the program on some level.



As detailed in the teams' final Outreach Program written reports, there was a consistent effort to increase community awareness and secure local media coverage of Challenge X in many markets during Year Three; though many of the teams focused on fewer, higher quality events, some of the teams secured strong media coverage similar to Year Two of the program.

Next year will take the Outreach Program to a new level, as the final year of Challenge X will focus on promotion and publicity. The teams are poised to focus on outreach activities next year as the competition organizers iron out the year's requirements and details.

Year Three Competition Media Event

This year's media ride-and-drive event was by far the strongest and best-attended event since the inception of the program. Executing the event in downtown Detroit made it easy for local media and Michigan-based trade media to participate, and extensive outreach prior to the competition resulted in significant media participation in the actual competition events at the Milford Proving Ground.

This year's radio tour was again a home run with 95 total radio interviews reaching an estimated listener audience of 7.7 million – confirming that radio is an excellent medium for promoting Challenge X, due to the ability to localize each story. Each of the 17 teams participated interviews over the course of the week surrounding the competition, and the three top-placing teams did additional interviews once results were announced.

The VNR that was distributed in the teams' home markets, combined with local Detroit-area television coverage, reached an audience of approximately 4.3 million viewers through a total of 33 unique stories. The national VNR, distributed separately, reached an estimated audience of 4.7 million.

Media Attendance at Year Three Competition

We had fantastic media interest in and attendance at the 2007 competition events. Twenty-seven reporters either attended events at the Milford Proving Ground, where they captured advance video/photography and conducted interviews; attended the media day and ride-and-drive event on June 7; or both (as noted individually below):

1. **African Americans On Wheels**—Chris Johnson
 - attended June 7 media event
2. **Auto Tech Daily**—Dan McCosh
 - attended June 7 media event
3. **Automotive Design and Production**—Gary Vasilash
 - attended June 7 media event
4. **Automotive Engineering International**—Lindsay Brooke
 - attended June 7 media event



5. **AutoWeek**—Kevin Wilson
 - attended June 7 media event
6. **Detroit Free Press**—Katie Merx and Rashaun Ruck (photographer)
 - attended June 7 media event
7. **Diesel and Hydrogen Forecast**—Scott Anderson
 - attended June 7 media event
8. **Edmunds.com**—Daniel Pund
 - attended June 7 media event
9. **GreatLakes IT Report**—Matt Roush
 - attended June 7 media event
10. **IPTV/PBS**—Paul Steinbronner and crew
 - attended MPG for advance coverage
11. **Newsweek**—Keith Naughton
 - attended MPG in advance and attended June 7 media event
12. **PodTech.net**—Matt Kelly
 - attended MPG in advance and attended June 7 media event
13. **Running on Fumes**—Jack LeFeber and crew
 - attended MPG in advance and attended June 7 media event
14. **WJBK-TV (Detroit FOX)**—Wendall Burke and Brigitte Chiroyan
 - attended MPG in advance and attended June 7 media event
15. **WUOM-FM (NPR affiliate)**—Dustin Dwyer
 - attended MPG for advance coverage
16. **Houston Chronicle**—Tim Spell
 - attended June 7 media event
17. **IEEE Spectrum**—John Voelcker
 - attended MPG in advance and attended June 7 media event
18. **Discovery Channel/Daily Planet (Canada)**—Rob Davidson and crew
 - attended MPG in advance and attended June 7 media event
19. **MSN Autos**—Larry Hall
 - attended MPG in advance and attended June 7 media event
20. **Green Car Journal**—Todd Kaho
 - attended June 7 media event
21. **Detroit Auto Scene**—Derek Stark
 - attended June 7 media event
22. **Detroit Auto Scene**—Bruce Pollock
 - attended June 7 media event
23. **WWJ-AM (Detroit talk radio)**—Jeff Gilbert & Matt Roush
 - attended June 7 media event



24. **GM Volt Blog**—Lyle Dennis
 - attended June 7 media event
25. **Groovy Green** (blog)—Matt Mayer
 - attended June 7 media event
26. **AutoBlogGreen**—Sam Abuelsamid
 - attended June 7 media event
27. **Green Options/EcoGeek** (blog)—Philip Proefrock
 - attended June 7 media event

Pending Coverage

We are still expecting to see coverage of the Challenge X 2007 competition in various print and television outlets, including:

Newsweek

Daily Planet (Discovery Channel)

Running on Fumes

IPTV/PBS

Auto Design & Production

MSN Autos

Automotive Engineering International

We will forward all pending coverage to the competition organizers this fall as it becomes available.



SECTION 2

U.S. and Canada Media Tracking Report

2006-2007 CHALLENGE X STUDENT COMPETITION U.S. and Canada Media Coverage Report

Total Coverage and Estimated Audience for Year Three:

- Online: **214 million** estimated from competition outreach (information on the competition ran on search engines such as Google, Yahoo! and MSN; on news sites such as Google News, Yahoo! News, WSJ.com, PR Newswire and Forbes.com; and on video sites such as YouTube, MetaCafe and Yahoo! Video. In addition, we tracked **103** online Challenge X stories throughout year (these audience figures not available).
- Print: **91** hits; over **4.8 million readers** (approximately 33 hits generated by the Outreach Program)
- Television: **283** local and national impressions; **10 million known viewers** – however, ratings were only available for a fraction of the TV clips – notably, the Bloomberg Night Talk audience can not be measured and we do not have audience numbers for some of the hits generated by the Outreach Program; therefore, the estimated audience reach should be much higher
- Radio: **119** discrete stories (including 6 state news networks , 8 regional news outlets and 1 state syndicate program to over **8.5 million listeners** (approximately 21 stories generated by the Outreach Program)

Total Minimum Audience: 214 million online during competition *plus* 23.3 million audience reach through conventional print and broadcast media over year. This is based on coverage received to date and does not include hits without trackable audience figures.

Media Coverage Analysis

Our numbers show an increase over last year's total audience reach of 22 million, with an outstanding increase in the online medium and significant increases in both the number of television and radio stories. While we have summarized its audience reach separately above, the importance of the online medium should not be underestimated – according to the Pew Research Center, one-third of Americans currently get their news online, compared with two percent just a decade ago. Notably, the percentage of people who get news online and electronically skews to the younger generation – which is one of our principal target audiences for the Challenge X program.

It should be noted that a significant portion of this year's coverage cannot be tracked and added into our totals. Specifically, more of the coverage reported by the teams as part of the Outreach Program does not have audience figures available, compared to last year. As detailed in the charts and supporting documentation below, 36% of the print stories, 10% of the television stories, and 18% of the radio stories do not have available audience numbers. We know intuitively, for example, that the Bloomberg TV clip and the NPR radio clips reach extensive audiences respectively, but the industry does not provide viewership or listenership figures for these major outlets.

When these issues are taken into account, we can safely assume that Year Three's media placement efforts reached a sizeable audience far more than the 23.2 million we are able to track.

U.S. and Canada Media Placements

PRINT:

Publication	Audience Size	Date	Market
Advanced Battery Technology	1,000	August 2006	U.S. National
Biodiesel Magazine	2,200	August 2006	U.S. National
Machine Design	182,355	August 10, 2006	U.S. National
Business Wire	Not Available	August 10, 2006	U.S. National
Wireless News	Not Available	August 11, 2006	U.S. National
RF Design	40,006	August 16, 2006	U.S. National
Tulsa Engineering Foundation Bulletin	Not Available	August 28, 2006	Tulsa, OK
Biodiesel Magazine	2,200	September 2006	U.S. National
Starkville Daily News	7,875	September 8, 2006	Columbus, MS
Greater Milwaukee Today	Not Available	September 29, 2006	Wisconsin
The Oshkosh Northwestern	21,662	September 30, 2006	Green Bay, WI
Comstock's Business- CA Capital Region	21,500	October 2006	Sacramento, CA
Momentum (magazine MS State)	Not Available	Fall 2006	U.S. National
Mass Media Distribution	Not Available	October 9, 2006	U.S. National
Mobile Emissions Today	Not Available	October 11, 2006	U.S. National
Ottawa Sun	51,068	October 16, 2006	Eastern Ontario, Canada
Terre Haute Tribune Star	25,920	October 17, 2006	Terre Haute, IN
The Lantern (Ohio State paper)	28,000	October 30, 2006	Columbus, OH
The California Aggie (UC Davis paper)	13,000	November 1, 2006	Davis, CA
The Daily Aztec	15,000	November 2, 2006	San Diego, CA
Ascribe Newswire	Not Available	November 3, 2006	U.S. National
The Daily Aztec	15,000	November 6, 2006	San Diego, CA
Rose Hulman (campus paper)*	Not Available	November 10, 2006	Terre Haute, IN
Oak Ridge Observer	8,000	November 16, 2006	Knoxville, TN
Brazil Times	4,700	November 22, 2006	Terre Haute, IN
The Commercial Dispatch	13,339	November 28, 2006	Columbus, MI
Starkville Daily News	7,875	November 28, 2006	Columbus, MS
Tennessee Alumnus Magazine	Not Available	Winter 2007	U.S. National
Echoes (magazine)	Not Available	Winter 2007	U.S. National
Business Wire	Not Available	January 22, 2007	U.S. National
Terre Haute Tribune Star	24,618	January 23, 2007	Terre Haute, IN
Akron Beacon Journal	118,771	January 31, 2007	Cleveland, OH
Wisconsin Engineer (magazine)	Not Available	February 2007	University of Wisconsin Engineering Department
Campus Insight	Not Available	February 2007	Rose-Hulman Institute of Technology
Engineers' Forum (magazine)	Not Available	February 1, 2007	U.S. National
Daily Texan	30,000	February 1, 2007	Austin, TX

Brazil Times	4,700	February 1, 2007	Terre Haute, IN
Daily Texan	30,000	February 5, 2007	Austin, TX
Austin American Statesman	174,330	February 10, 2007	Austin, TX
Houston Sun (also ran online)	Not Available	February 10, 2007	Houston, TX
The California Aggie (UC Davis paper)	13,000	February 21, 2007	Davis, CA
Automotive Industries	70,109	March 2007	U.S. National
West Side Leader	46,500	March 8, 2007	Akron, OH
Machine Design	182,355	March 22, 2007	Cleveland, OH
TN Engineer (U of T Engineering newsletter)	Not Available	Spring 2007	University of Tennessee
Bagley College of Engineering Newsletters	Not Available	April 2007	Mississippi State
Advanced Materials & Processes	23,819	April 1, 2007	Cleveland, OH
Mining Gazette*	9,134	April 7, 2007	Marquette, MI
The Penn State Daily Collegian (also ran online)	Not Available	April 10, 2007	Penn State Campus
Terre Haute Tribune Star	24,618	April 10, 2007	Terre Haute, IN
Michigan Tech Lode*	3,000	April 10, 2007	Marquette, MI
U.S. State News	Not Available	April 19, 2007	U.S. National
The Observer-Reporter	35,103	April 29, 2007	Pittsburgh, PA
Automotive Engineering International	85,693	May 2007	U.S. National
Akron Beacon Journal	118,771	May 3, 2007	Akron, OH
Lubbock Avalanche Journal*	50,587	May 3, 2007	Lubbock, TX
CNN Matthews (press release)	Not Available	May 4, 2007	Canada (National)
Terre Haute Tribune Star	24,618	May 8, 2007	Terre Haute, IN
Waterloo Record	63,631	May 9, 2007	Waterloo, Ontario
Woodstock Sentinel-Review	7,000	May 10, 2007	Woodstock, Ontario
Ascribe (press release distributor)	Not Available	May 14, 2007	U.S. National
US State News (press release)	Not Available	May 25, 2007	Mississippi
Business Wire (press release)	Not Available	May 29, 2007	U.S. National
Outside Magazine	650,972	June 2007	U.S. National
Detroit Free Press	656,953	June 3, 2007	Detroit, MI
Midland Daily News	17,400	June 3, 2007	Midland, MI
The Capital Times	17,581	June 4, 2007	Madison, WI
Wisconsin State Journal	87,547	June 4, 2007	Madison, WI
Terre Haute Tribune Star	24,618	June 5, 2007	Terre Haute, IN
Detroit Free Press	329,989	June 8, 2007	Detroit, MI
Starkville Daily News	7,875	June 9, 2007	Starkville, MS
Terre Haute Tribune Star	24,618	June 12, 2007	Terre Haute, IN
Jackson Clarion Ledger	90,055	June 12, 2007	Jackson, MS
Jackson Clarion Ledger	90,055	June 13, 2007	Jackson, MS
AutoTech Daily	72,000	June 13, 2007	Bloomfield Hills, MI
Houston Chronicle	503,114	June 13, 2007	Houston, TX
US State News	Not Available	June 14, 2007	U.S. National
US State News	Not Available	June 14, 2007	U.S. National
Business Wire	Not Available	June 14, 2007	U.S. National

Industry Week	182,216	June 14, 2007	U.S. National
US State News	Not Available	June 15, 2007	U.S. National
Detroit Auto Scene	11,000	June 18, 2007	Detroit, MI
AutoWeek	268,001	June 18, 2007	U.S. National
Greater Milwaukee Today	Not Available	June 22, 2007	Wisconsin
Akron Beacon Journal	118,771	June 26, 2007	Cleveland, OH
Business Wire	Not Available	June 29, 2007	U.S. National
eMediaWire	Not Available	June 29, 2007	U.S. National
Advanced Battery Technology	1,000	July 2007	U.S. National
Commercial Dispatch	13,532	July 11, 2007	Columbus, MS
Biodiesel Magazine	2,200	August 2007	U.S. National
Green Car Journal	30,000	Summer 2007	U.S. National
Minimum Total Audience	4,800,554		

** These stories were reported by the teams in their final Outreach Program reports. However, the teams did not include a clip for this coverage, and current news searches yield no results.*

TELEVISION:

Station	Audience Size	Date	Market
TUTV-TV*	Not Available	August 25, 2006	Tulsa, OK
Discovery Channel (Daily Planet)	Not Available	September 25, 2006	Canada
WDBJ-TV	66,655	October 16, 2006	Roanoke, VA
WDBJ-TV	14,840	October 17, 2006	Roanoke, VA
KGTV-TV*	Not Available	November 2, 2006	San Diego, CA
WTNZ-TV	19,715	November 12, 2006	Knoxville, TN
WATE-TV	12,294	November 13, 2006	Knoxville, TN
WATE-TV	20,599	November 13, 2006	Knoxville, TN
Time Warner Cable Channel*	Not Available	November 17, 2006	Akron, OH
Time Warner Cable Channel*	Not Available	November 24, 2006	Akron, OH
WOBV-TV	Not Available	November 28, 2006	Starkville, MS
WTHI-TV	10,141	December 9, 2006	Terre Haute, IN
KQFX-TV*	Not Available	January 31, 2006	Terre Haute, IN
WFXW-TV	4,541	January 31, 2007	Terre Haute, IN
WTWO-TV	8,999	January 31, 2007	Terre Haute, IN
PBS NOVA	Not Available	February 2007	Not Available
KCBD-TV	10,696	February 1, 2007	Lubbock, TX
KXAN-TV	29,104	February 2, 2007	Austin, TX
KXAN-TV	32,157	February 2, 2007	Austin, TX
KVUE-TV	34,272	February 2, 2007	Austin, TX
TXCN-TV (News 8 Austin)	Not Available	February 2, 2007	Austin, TX
TXCN-TV (News 8 Austin)	Not Available	February 2, 2007	Austin, TX
TXCN-TV (News 8 Austin)	Not Available	February 2, 2007	Austin, TX
TXCN-TV (News 8 Austin)	Not Available	February 2, 2007	Austin, TX
TXCN-TV (News 8 Austin)	Not Available	February 2, 2007	Austin, TX

KXAN-TV	6,900	February 3, 2007	Austin, TX
WLUC-TV	Not Available	February 6-7, 2007	Marquette, MI
NRK Net TV (Norwegian TV)*	Not Available	February 18, 2007	N/A
KBWB-TV	Not Available	February 24, 2007	San Francisco, CA
ZTV-TV*	Not Available	April 2007	Not Available
KTUL-TV*	Not Available	April 16, 2007	Tulsa, OK
KOTV-TV	48,421	April 17, 2007	Tulsa, OK
KOTV-TV	49,540	April 17, 2007	Tulsa, OK
KOTV-TV	36,534	April 17, 2007	Tulsa, OK
WBOY-TV	11,128	April 25, 2007	Clarksburg, WV
WBOY-TV	9,219	April 25, 2007	Clarksburg, WV
KLBK-TV	6,132	May 7, 2007	Lubbock, TX
KLBK-TV	7,327	May 7, 2007	Lubbock, TX
KLBK-TV	1,211	May 8, 2007	Lubbock, TX
WTWO-TV	12,189	May 11, 2007	Terre Haute, IN
WTHR-TV	112,981	May 11, 2007	Indianapolis, IN
WFXW-TV	4,541	May 11, 2007	Terre Haute, IN
WTWO-TV	8,999	May 11, 2007	Terre Haute, IN
WTHI-TV	14,485	May 11, 2007	Terre Haute, IN
WLUC-TV	Not Available	May 24, 2007	Marquette, MI
WLNS-TV	2,068	May 24, 2007	Lansing, MI
WLNS-TV	2,068	May 24, 2007	Lansing, MI
WKBW-TV	16,159	May 28, 2007	Buffalo, NY
WKBW-TV	15,252	May 28, 2007	Buffalo, NY
WJAC-TV*	Not Available	May 29, 2007	State College, PA
WBOY-TV	17,482	June 6, 2007	Clarksburg-Weston, WV
WMTV-TV	7,829	June 7, 2007	Madison, WI
KOTV-TV	64,999	June 7, 2007	Tulsa, OK
WMTV-TV	35,221	June 7, 2007	Madison, WI
WJBK-TV	77,757	June 7, 2007	Detroit, MI
WCBI-TV	20,065	June 7, 2007	Columbus-Tupelo-West Point, MS
WFXW-TV	4,541	June 7, 2007	Terre Haute, IN
WMTV-TV	22,035	June 7, 2007	Madison, WI
WTWO-TV	8,999	June 7, 2007	Terre Haute, IN
WMTV-TV	Not Available	June 7, 2007	Madison, WI
WTWO-TV	Not Available	June 7, 2007	Terre Haute, IN
WCBI-TV	9,015	June 8, 2007	Columbus-Tupelo-West Point, MS
WKOW-TV	Not Available	June 8, 2007	Madison, WI
WKOW-TV	Not Available	June 8, 2007	Madison, WI
WKOW-TV	Not Available	June 8, 2007	Madison, WI
WTWO-TV	8,589	June 8, 2007	Terre Haute, IN
WKOW-TV	9,676	June 8, 2007	Madison, WI
WFXW-TV	4,541	June 8, 2007	Terre Haute, IN
WTOK-TV	16,160	June 10, 2007	Meridian, MS

WTOK-TV	10,667	June 11, 2007	Meridian, MS
BLTV/Bloomberg	Not Available	June 11, 2007	U.S. National
BLTV/Bloomberg	Not Available	June 11, 2007	U.S. National
The Weather Channel (TWC)	690,679	June 12, 2007	U.S. National
The Weather Channel (TWC)	265,726	June 12, 2007	U.S. National
The Weather Channel (TWC)	265,726	June 12, 2007	U.S. National
The Weather Channel (TWC)	265,726	June 13, 2007	U.S. National
The Weather Channel (TWC)	347,130	June 13, 2007	U.S. National
The Weather Channel (TWC)	347,130	June 13, 2007	U.S. National
The Weather Channel (TWC)	613,539	June 13, 2007	U.S. National
The Weather Channel (TWC)	613,539	June 13, 2007	U.S. National
The Weather Channel (TWC)	612,850	June 13, 2007	U.S. National
WTOK-TV	15,777	June 13, 2007	Meridian, MS
WCBI-TV	21,814	June 15, 2007	Columbus-Tupelo-West Point, MS
WKBW-TV	15,252	June 19, 2007	Buffalo, NY
KOKI-TV	26,049	June 26, 2007	Tulsa, OK
KOTV-TV	64,999	June 26, 2007	Tulsa, OK
KJRH-TV	40,043	June 26, 2007	Tulsa, OK
KOKI-TV	33,216	June 26, 2007	Tulsa, OK
WTOK-TV	15,777	July 13, 2007	Meridian, MS
PBS—Motorweek	Not Available	July 21, 2007	U.S. National
PBS—Motorweek	8,952	July 22, 2007	Detroit, MI
PBS—Motorweek	49,868	July 27, 2007	
PBS—Motorweek	79,643	July 28, 2007	U.S. National
Minimum Total Audience	5,355,955		

** These stories were reported by the teams in their final Outreach Program reports. However, the teams did not include a clip for this coverage, and current news searches yield no results.*

--It is important to note while we do not have a listing of dates and audience numbers, the Discovery Channel (Canada) clip has run subsequent repeats since its airing in September 2006.

RADIO:

The following summarizes the individual team interviews as part of the competition Radio Tour:

<u>University</u>	<u>Number of Interviews Scheduled</u>	<u>AQH Numbers</u>
Michigan Tech	7	195,500
Mississippi State University	9 (4+5 as winners)	2,159,700
Ohio State University	4	148,500 + 2 NPR stations*
Penn State University	3	90,700
Rose Hulman Institute	7	225,900 + 1 NPR station*
San Diego State University	3	132,600
Texas Tech	2	41,500 + 1 NPR station*
University of Akron	5	132,800 + 1 NPR station*
UC Davis	7	1,065,200
U of M	11	339,100 + 1 NPR station*

University of Tennessee-Knoxville	3	213,100
University of Texas-Austin	3	1,313,700
University of Tulsa	5	265,300
University of Waterloo	2	142,800
University of Wisconsin Madison	8 (4+4 as winners)	351,400
Virginia Tech	12 (7+5 as winners + Reader)	690,500 + 1 NPR station* (2x)
West Virginia University	4	181,000
Totals.....	95+1 Reader	7,689,300

Total Interviews: 95 + 1 on-air reader
Total Average Quarter Hour: 7,689,300 (not including NPR reach*)

**NPR does not subscribe to Arbitron; therefore audience reach for this coverage can not be measured and is not included in our figures.*

The following summarizes the national news network, three nationally syndicated shows, six state news networks, eight regional news services and one state syndicated program that aired interviews:

National News Network	USA Radio News Network	1,400 Affiliates
Nationally Syndicated Talk Shows	Talk Radio America	100 Affiliates
	Talk Radio Net (Motor Trend)	132 Affiliates
	Talk Radio Net (AutoWorld)	100+Affiliates
State News Networks	Mississippi News Network	35 Affiliates-2 interviews
	Ohio State News Network	61 Affiliates
	Ohio News NPR Network*	35 Affiliates
	Tennessee News Network	80 Affiliates
	Wisconsin News Network	50 Affiliates-2 interviews
	Virginia News Network	45 Affiliates-1Reader
Regional News Service	Pittsburg Metro Source Service	52 Affiliates
	Indiana Metro Source Service	32 Affiliates
	Ohio Metro Source Service	28 Affiliates
	California Metro Service	52 Affiliates
	Michigan Metro Source Service	65 Affiliates
	Oklahoma Metro Service	10 Affiliates
	Wisconsin Metro Service	15 Affiliates-2 interviews
	Virginia Metro Service	15 Affiliates
State Syndicated Program	Michigan Talk Radio Net.	12 Affiliates

The following summarizes the radio interviews OUTSIDE the competition Radio Tour that teams conducted as part of the Outreach Program during Year Three:

Station	Audience Size	Date	Market
Wisconsin Public Radio	Not Available	January 2007	Madison, WI
Southern Urban Radio Network	400,000	January 30, 2007	Mississippi



Southern Urban Radio Network	400,000	January 30, 2007	Mississippi
KLBJ-AM	6,900	January 30, 2007	Austin, TX
KLBJ-AM	6,900	January 30, 2007	Austin, TX
WIBA-AM	3,700	January 30, 2007	Madison, WI
WIBA-AM	3,700	January 30, 2007	Madison, WI
WFIR-AM	2,800	February 1, 2007	Roanoke, VA
WFIR-AM	2,800	February 1, 2007	Roanoke, VA
WLNI News-FM*	Not Available	February 1, 2007	Roanoke, VA
WJNI-FM	Not Available	February 1, 2007	Charleston, SC
WALT-AM	Not Available	March 12, 2007	Meridian, MS
WKMG-AM	Not Available	April 14, 2007	Columbia, SC
WOLV-FM	Not Available	April 20, 2007	Marquette, MI
KTSO-FM*	Not Available	April 21, 2007	Tulsa, OK
WAKR-AM*	Not Available	May 11, 2007	Akron, OH
WMSV (MSU radio station)	Not Available	May 22, 2007	Mississippi region
WMSV (MSU radio station)	Not Available	May 22, 2007	Mississippi region
WMSV (MSU radio station)	Not Available	May 22, 2007	Mississippi region
WLZA-FM	Not Available	May 22, 2007	Mississippi region
WLZA-FM	Not Available	May 22, 2007	Mississippi region
WMPL-AM	Not Available	May 24, 2007	Hancock, MI
KFYO-AM*	Not Available	June 1, 2007	Lubbock, TX

** These interviews were reported by the teams in their final Outreach Program reports. However, the teams did not include a clip for this coverage, and current news searches yield no results.*

ONLINE†:

Outlet	Date
Automotive Design Line	September 29, 2006
Rocketboom.com	October 2, 2006
US State News	October 4, 2006
Mototron	October 10, 2006
Automotivedesignline.com	October 13, 2006
Rose-Hulman Web site*	October 13, 2006
Canada News Wire	October 16, 2006
WVU College of Engineering Web site	October 26, 2006
PSU Live*	October 27, 2006
SDSUniverse	October 31, 2006
WATE.com	November 12, 2006
Scienceandsociety.net (podcast)	November 17, 2006
Wikipedia.org	November 21, 2006
Mississippi State	January 2, 2007
BigBlog (UK)	January 7, 2007
MSN Autos	January 7, 2007
Rose Hulman.edu	January 9, 2007
National Football League News (blog)	January 13, 2007
GM Inside News	January 18, 2007

Green Car Congress	January 22, 2007
American Digital Networks	January 22, 2007
The Auto Channel	January 22, 2007
Auto Blog Green	January 24, 2007
Auto Blog Green	January 24, 2007
Auto Blog Green*	February 1, 2007
Insurance News Net	February 1, 2007
Paddock Talk	February 2, 2007
KVUE.com	February 2, 2007
PRDOMAIN.com	February 2, 2007
HULIQ.com	February 3, 2007
Technology News Daily	February 4, 2007
Auto Central.com	February 9, 2007
Statesman.com	February 10, 2007
Houstonsun.com	February 10, 2007
Virginia Tech (web site)*	February 12, 2007
West Virginia College of Engineering site	February 15, 2007
IEEE Spectrum Online	February 28, 2007
After Gutenberg	March 2, 2007
Gregoire's CleanTech Blog	March 6, 2007
Auto Blog Green	March 29, 2007
Broadcast Newsroom (Online)	April 9, 2007
Automotive Design Line	April 12, 2007
West Virginia College of Engineering site	April 27, 2007
H2 Daily	May 6, 2007
University of Waterloo (web site)	May 7, 2007
Inside Indiana Business	May 11, 2007
Rose Hulman.edu*	May 11, 2007
PlanetSave.com	May 14, 2007
yBiofuels.com	May 16, 2007
Planet Analog*	May 21, 2007
The VI Road Show	May 22, 2007
Penn State Live	May 22, 2007
Outside Online	June 2007
Diesel and Hydrogen Forecast	June 2007
Auto Blog Green (blog)	June 3, 2007
AOL News	June 4, 2007
AutoBlog.com	June 7, 2007
Edmunds.com	June 7, 2007
AutoWeek	June 7, 2007
Shane's Drivel (blog)	June 7, 2007
Hotcars.2pt.net (blog)	June 7, 2007
After Gutenberg (blog)	June 7, 2007
GreenOptions.com	June 7, 2007
EcoGeek.org	June 7, 2007

Grow Detroit (blog)	June 7, 2007
Edmunds.com	June 8, 2007
EarthTimes.org	June 8, 2007
Auto Channel (online)	June 9, 2007
TheNewsMarket.com	June 9, 2007
Auto-Offline (blog)	June 9, 2007
WorldChanging.com	June 10, 2007
Wind River (blog)	June 11, 2007
University of Waterloo (online)	June 11, 2007
Egghead (UC Davis blog)	June 11, 2007
Auto Blog Green (blog)	June 11, 2007
Popular Mechanics (online)	June 11, 2007
Envautomental (blog)	June 11, 2007
University of Illinois Center for Advanced BioEnergy Research	June 11, 2007
GreenOptions.com	June 12, 2007
EcoGeek.org (blog)	June 12, 2007
GM Inside News (online)	June 12, 2007
Groovy Green (blog)	June 13, 2007
Next Gear on PodTech.net	June 13, 2007
Next Gear on PodTech.net	June 13, 2007
Next Gear on PodTech.net	June 13, 2007
Next Gear on PodTech.net	June 13, 2007
Next Gear on PodTech.net	June 13, 2007
Next Gear on PodTech.net	June 13, 2007
Next Gear on PodTech.net	June 13, 2007
Next Gear on PodTech.net	June 13, 2007
West Virginia University (online)	June 13, 2007
Diesel Technology Forum	June 14, 2007
AskPatty.com	June 16, 2007
MyRide.com	June 22, 2007
GM FYI Blog	June 29, 2007
Smart Money.com	June 29, 2007
Mathworks.co.uk	June 29, 2007
Consumerelectronicsnet.com	June 29, 2007
IEEE Spectrum Online	July 2, 2007
Automotive Design Line	July 13, 2007
Automotive Design Line	July 18, 2007
Embedded.com	July 19, 2007
Rose Hulman online	July 19, 2007
Davis Wiki	July 27, 2007
TheTruthAboutCars.com	August 14, 2007

¹Audience estimates are not available for this medium.

* Coverage reported by the teams resulting from Outreach Program efforts. However, the team did not include a clip for this coverage, and current news searches yield no results.



SECTION 3

Selected Quotes



“Reinforcing the importance of consumer acceptance, the Challenge X entrants will go on the road and seek public feedback. Prizes are likely to go to teams whose vehicles are best rated by actual consumers along the way, and remain drivable and reliable over an 800- to 1600-kilometer road rally that will end in Washington, D.C.”

IEEE Spectrum (Online)
July 2007

“Challenge X organizers said that the main objective of the engineering teams were to significantly reduce the total energy consumed by a vehicle, beginning with the harvesting/processing of its chosen fuel type all the way through to how efficiently the final product uses that fuel – an approach known as well-to-wheel analysis.”

Detroit Auto Scene
June 18, 2007

“There’s nothing new about experimental vehicles roaming the streets of Detroit, but 17 specially prepared SUVs garnered extra attention last week. The teams who re-engineered these 2005 Chevrolet Equinoxes represent North American universities in Challenge X 2007, a competition sponsored by General Motors and the U.S. Department of Energy.”

Houston Chronicle
June 13, 2007

“The burden of testing advanced technology for alternative-fuel vehicles doesn’t have to fall squarely on the shoulders of Detroit’s engineers. Why not enlist some brilliant minds of the future help out, too? Seventeen universities just completed a key stage of the Challenge X, a four-year engineering competition charging students to design and implement a “green” biofuel-powered hybrid vehicle.”

Popular Mechanics
June 11, 2007

“The propulsion systems aren’t planned for production right away, but top engineers from General Motors Corp. and the U.S. Department of Energy said the students’ work could influence future product decisions, help address concerns about the nation’s dependence on foreign oil and limit the emissions believed to cause global warming.”

Detroit Free Press
June 8, 2007

“Designs presented by the student engineers offer advanced technologies ranging from fuel cell hybrids to split parallel hybrids to through-the-road-parallel hybrids. Although the Department of Energy, industry and universities have formed competition series in the past, the competition launched in 2004 is different from previous competitions, challenging the students to achieve better fuel economy, lower emissions and follow an industry standard in the vehicle development process. This real-world process forces the teams to present designs that are ready for the consumer marketplace.”

Houston Sun
February 10, 2007





SECTION 4

Select Print and Online Clips

UT students take GM fuel-efficiency challenge

Austin American-Statesman

By: Ricardo Gándara

February 10, 2007

The future of cars — those using alternative fuels to minimize impact on the environment — could rest in the hands of college students. At least that is the thinking of General Motors and the U.S. Department of Energy, who sponsored a week-long workshop for 17 U.S. and Canadian collegiate teams competing in the exploration of cutting-edge technologies at the University of Texas' J.J. Pickle Research Center last week.

The goal? "Our entry is a realistic attempt of low fuel consumption and lower emissions with the current infrastructure in place, that is, what's available to consumers now," said Ted Kane, a post graduate student in mechanical engineering at UT, looking at the Chevrolet Equinox SUV he and other mechanical engineering students have been working on for more than a year.

GM, the Energy Department and several corporations have sponsored Challenge X, a competition to re-engineer the Equinox, for three years. Students get the opportunity to be part of "hands-on research and development with leading-edge automotive propulsion, fuels, materials and emissions-control technologies," according to the UT Web site detailing the work (www.me.utexas.edu/challengex). Since 2004, 30 Thirty students nationwide have done well enough in their projects to land engineering jobs with the automaker.

UT's entry, called a "mild hybrid," uses a 42-volt belt-driven starter/alternator that shuts down the engine at stop lightsto conserve fuel. The 14-member team is developing a "high efficiency dilute gasoline engine" that runs on biodiesel and reformulated gasoline (blended fuels).

"We are using a stock diesel engine that is modified to run on gas and diesel. The question we get asked most is, 'how are you not going to destroy the engine?' In using gasoline in a diesel engine, fuel combusts spontaneously and burns a hole in the piston and destroys it," Kane said.

To solve the problem, "we are running a large amount of exhaust-gas recirculation in the engine," team member Nicole Munguia said. "That keeps the engine at a cool temperature. It keeps the gasoline from detonating prematurely, also known as engine knock."

There have been challenges. "We had wiring issues with the engine. Many other little problems have caused a lot of heartburn," Kane said.

Still, the students are optimistic with their work, especially being part of technology development that will produce more efficient vehicles.

Munguia said the modifications to their vehicle already are showing results for the stock Equinox that averages 21.3 mpg. "Our computer models show that the Equinox can get 33.7 miles per gallon," she said. However, road tests have yet to be done.

UT and other colleges will learn in June how industry professionals judge their work. General Motors will announce the winner after field tests for towing capacity, acceleration, ride and handling, noise and vibration, greenhouse gas impact, fuel economy and consumer appeal. At stake for the colleges and their teams is \$90,000 in cash prizes and awards. GM already has benefited from students' research.

"With regard to Challenge X, GM is currently pursuing several of the advanced propulsion technologies and alternative fuels that the Challenge X teams are also using in their Equinox vehicles," said Susan Garavaglia, a GM spokeswoman. "At this time, no new propulsion technology solutions have surfaced from the teams, but one more year has been added to the three-year Challenge X competition series, and GM is anxious to see how the students further refine the integration of their propulsion systems in their vehicles."

Austin-based Freescale Semiconductor and National Instruments are among the 30 sponsors providing funding and products to the teams.

Rose-Hulman students assemble innovative biodiesel hybrid electric Chevrolet Equinox

Terre Haute Tribune Star

June 5, 2007

TERRE HAUTE— The sports utility vehicle's economy savings and ecology safeguards will be revealed Thursday when results of weeklong performance evaluations, dynamics and drivability testing, and technical presentations, will be announced at General Motors' Proving Grounds in Milford, Mich.

Rose-Hulman's team was the sixth team out of 17 competitors to successfully compete all vehicle dynamic events on Monday and is looking to improve upon last year's 10th place finish and the 15th place after the first year of the four-year competition.

Approximately 45 Rose-Hulman students have worked on replacing the Equinox's gasoline-powered engine with a biodiesel engine and a custom powersplit hybrid 1-mode transmission, featuring two integrated electric machines. Team members estimate that the crossover SUV will now get about 35 mpg, a significant increase from the stock 25 mpg, and has improved 50-70 mph passing acceleration time.

The goal of the third year of competition was to present a 99 percent production-ready vehicle to the judges from General Motors and other leading industries.

"We have completely stripped down a brand new vehicle [Equinox] and put it back together again, with several new features, in less than two years," stated Clint Hammes, the team's mechanical integration team leader. "We have a vehicle that's filled with cutting-edge technology and innovative features."

Launched in 2004, Challenge X was originally scheduled for completion in 2007 but is being extended to a fourth year. The competition gives teams the opportunity to focus on customer acceptability, road reliability and the extended durability of their advanced propulsion systems.

"Challenge X is different from other competitions because GM has offered students unprecedented access to the world of vehicle design," states mechanical engineering faculty co-advisor Zac Chambers.

"Students have taken an industry-standard design approach to deliver a production-ready vehicle on an accelerated timetable."

The first year of the competition focused on the vehicle design. Students developed computer simulations to compare the various powertrain options and determine that the powersplit, similar the system used in the Toyota Prius, would best meet their performance criteria. Once the teams successfully completed the vehicle design process, at the end of year one, they received the crossover sport utility vehicle.

Years two and three have focused on turning the design into reality. Last May, the team presented a proof-of-concept vehicle which, while lacking in interior space, demonstrated clearly that the team

could fabricate and control the complex powersplit architecture. This year, aspects in the proof-of-concept were extended into a production-ready vehicle.

“General Motors graciously provided us with a second Equinox vehicle so that our students could start from a safe platform,” Chambers said.

Rose-Hulman students have been creative and innovative to overcome challenges faced by the use of alternative fuels, according to electrical engineering faculty co-advisor Marc Herniter.

“The competition has uncovered exciting new technologies to our students that will further the world of automotive design and help us crossover to sustainable mobility,” stated Herniter.

Electrical Integration Systems Team Leader Joseph “Rusty” Berg stated, “The practical experiences have been enormous. There are a lot of things you learn while turning a wrench or trying to put everything back together again. The Challenge X project has been the capstone of my college education — putting everything together in a comprehensive package.”

The Challenge X experience has encouraged students towards careers in the automotive industry.

“It has been an amazing hands-on learning experience,” said Rebecca Winer, a sophomore mechanical engineering major from Akron, Ohio. “I’ve learned 10 times more things while working on this project than through classroom assignments.”

Overall Project Leader Zach Pieri, a senior mechanical engineering major, added, “Our team has learned a lot from its mistakes and recognized areas that could be improved along the way. We have used our resources effectively and have developed a strong vehicle.”

Rose-Hulman’s team has shown steady improvement throughout the three-year vehicle development process. The team placed 15th overall after the first year and improved to 10th last year. Team and faculty members have received several honors from the National Science Foundation, The Mathworks, Freescale Technology Forum and the Lyn St. James Foundation for its design and teamwork abilities during the project.

General Motors is one of the headline sponsors of the Challenge X competition. GM donated new Equinox crossover vehicles to each of the university teams at the end of the first year of the competition. GM also provided each university team with \$10,000 in seed money and donated use of its engineering, testing and proving-ground facilities for student workshops and competitions. Finally, GM provided highly controlled access to its intellectual property and staff support, including a program manager, team mentors and event judges.

Other sponsors include the U.S. Department of Energy, Natural Resources Canada, The MathWorks, National Instruments, U.S. Environmental Protection Agency, U.S. Department of Transportation, Freescale Semiconductor, AVL Powertrain Engineering, National Science Foundation, British Petroleum and Sensors Inc.

Part of Rose-Hulman’s Advanced Transportation System initiative, the Challenge X team has been supported by AllTran Transmission, Bosch International, Caterpillar, Cavallini Engineering, Cummins, Daimler-Chrysler, Darrin Davidson Family, Delphi, Detroit Diesel, Illiana Truck Parts, Indiana Department of Commerce’s Energy and Defense Development Office, Jasper Engines & Transmissions, The MathWorks, Naval Surface Warfare Center-Crane, Penske Automotive,

Pickett's Place, Remy International, Rolls-Royce, Rose-Hulman Ventures, Texas Instruments, Toyota and VM Motori.

Rose-Hulman is the lone Indiana college or university selected to participate in Challenge X, and only team that consists entirely of undergraduate students. The list of competitors includes Michigan Technological University, Mississippi State University, Ohio State University, Pennsylvania State University, San Diego State University, Texas Tech University, University of Akron, University of California-Davis, University of Michigan, University of Tennessee, University of Texas-Austin, University of Tulsa, University of Waterloo, University of Wisconsin-Madison, Virginia Tech, and West Virginia University.

For more about the Challenge X competition and Rose-Hulman's Challenge X team, visit www.challengex.org and www.rose-hulman.edu/challengex.

Challenge X - GM Supports Alternative Vehicle Research

GreenOptions.com & EcoGeek.org (blogs)

By: Philip Proefrock

June 7, 2007

I had the opportunity last week to visit General Motors' headquarters in downtown Detroit for an event with the Challenge X program. Challenge X is a program co-sponsored by GM and the US Department of Energy. Teams from universities across the US (and one from Canada) were given a stock Chevrolet Equinox to use as the base vehicle platform and were challenged to improve its efficiency and reduce its fuel use. "Seventeen teams have been challenged to re-engineer a GM Equinox, a crossover sport utility vehicle to minimize energy consumption, emissions, and greenhouse gases while maintaining or exceeding the vehicle's utility and performance."

This is a multi-year program, which has already gone through two years of evaluations and awards. And, while the initial information I had about the program was that this was the conclusion of the challenge, I learned that there is going to be a fourth year to the program, which will focus on consumer acceptability issues.

The top three programs for this year's competition were Mississippi State (1st place), University of Wisconsin (2nd place), and Virginia Tech (3rd place). The vehicles went through a multi-day testing at GM's proving grounds, and were judged on numerous criteria. More information about the Challenge X results can be found on GM's FYI blog.

I talked for a bit with Dr. Andrew Frank, the faculty adviser, and with Terrence Williams, the project team leader for the team from University of California at Davis, who call themselves Team Fate. Of the 17 teams in Challenge X, only the team from UC-Davis had a plug-in hybrid vehicle. (Unfortunately, a broken clutch kept them from completing the competition, and their vehicle was not one that was available to be driven.) To help demonstrate their vehicle's ability to travel without needing to use its internal combustion engine, Team Fate had a demonstration trailer with a solar panel for charging their vehicle (though it wasn't able to be on display with the vehicle). Like the Volt, it was designed to be able to travel a reasonable range based on a charge collected from a plug in source (be it a solar PV array on a garage roof or just a grid-tied circuit) and avoid the use of the fuelled half of the system altogether.

Several other Challenge X vehicles were available to be driven (albeit just a trip around the block at GM's Renaissance Center headquarters in Detroit). Most of the teams (12 of the 17 competitors) used biodiesel (all were using a B20 blend) as their fuel. One team which went a bit farther with their entry, however, was the University of Waterloo's vehicle, which was powered by a hydrogen fuel cell, rather than some form of internal combustion engine. (I had the chance to drive that vehicle, and that will be covered in a forthcoming article.)

In addition to the announcement of the winners in this year's stage of the Challenge X program, I also had an opportunity to meet with a couple of GM executives, who were discussing aspects of GM's forthcoming Volt program, which was the topic of everyone's interest.

Micky Bly, engineering director for GM's hybrid vehicle integration controls, spoke to several bloggers present as a special outreach. Much of the discussion dealt with the issue of batteries for the new Chevrolet Volt. When GM committed to the Volt, the question of where they were going to find the batteries with sufficient technology seemed to be one of the key obstacles to bringing a plug-in hybrid to the marketplace. The week before, GM had announced their selection of two suppliers to work with in moving toward the development of a suitable battery. This is a big step forward in bringing this car to the market, and there were many questions about the program.

The focus is on lithium-ion batteries, which are, essentially, a scaled up version of what you have in your cell phone or your laptop computer, in all likelihood. Lithium-ion batteries have the working charge range and the energy density to serve as the batteries for this vehicle. But, as has been seen in several recent cases, sometimes these batteries can overheat and cause fires, and those problems need to be solved if GM is going to be able to offer a 10 year/100,000 mile warranty on them (which, according to the discussions I had, is what GM is planning).

While no one would give us a release date for the Volt, there is strong enthusiasm for this program among all the people I spoke to. Both Larry Burns (GM's Vice President, Research & Development and Strategic Planning) and Micky Bly spoke about "displacing petroleum." Much of the focus with the new vehicle systems that GM is developing, as well as the Challenge X entries, are working to reduce the amount of petroleum that is required for transportation.

Tech students offer fuel solutions Drive systems could influence direction of U.S. efficiency efforts

Detroit Free Press

By: Katie Merx

June 8, 2007

Sick of paying \$40 or more to fill up your tank? Worried about global warming? If so, you might be interested in the advanced drive systems that student engineers showed off in downtown Detroit on Thursday.

As gas prices remain above \$3 a gallon, teams of college students involved in the Challenge X automotive engineering competition used a variety of advanced propulsion technologies. Their goal was to increase fuel efficiency and make vehicles more environmentally friendly without sacrificing their appeal to consumers.

The propulsion systems aren't planned for production right away, but top engineers from General Motors Corp. and the U.S. Department of Energy said the students' work could influence future product decisions, help address concerns about the nation's dependence on foreign oil and limit the emissions believed to cause global warming.

"I think the work these young people are doing is going to help solve our energy problems," said John Mizroch, a deputy assistant secretary for the Department of Energy. The teams, which assembled at GM's world headquarters in the Renaissance Center, built systems to adapt Chevrolet Equinox SUVs to use a variety of alternative fuels. For the competition, the teams were graded not only on environmental impact, but also on traditional consumer considerations, including acceleration, ride and handling and towing capability.

The winning team from Mississippi State University powered its Equinox with a parallel hybrid system that uses a 1.9-liter GM direct-injection, turbo-diesel engine paired with an electric motor to power the back wheels.

The team's propulsion system captures the gasoline equivalent of better than 35 miles per gallon, emits slightly less carbon dioxide than traditional petroleum-fueled vehicles and uses 20% less petroleum than the average vehicle.

The system's fuel economy compares with the 34-mile-per-gallon combined fuel economy rating on the Ford Escape Hybrid and the 29 m.p.g. rating for the Saturn Vue Hybrid and Toyota Highlander Hybrid.

"They definitely could produce hybrids in this configuration for production," said Becky Gunn, 22, the team leader from the second-place University of Wisconsin, which used a propulsion system similar to that used by Mississippi State's team.

Larry Burns, GM's vice president of development, research and strategic planning, said the students' work is "truly going to make a difference in the world."

GM has already hired 40 students who have worked on Challenge X vehicles in the past three years and expects to extend offers to as many as a dozen current team members as early as next week, Burns said.



Javier Somoza of the University of Michigan displays U-M's entry in the Challenge X engineering competition. The engine runs on biofuels. The competition took place Thursday at GM's world headquarters in Detroit.

Challenge X Winner Redesigns Chevy Equinox Gives It Massive Increase in Fuel Economy

Edmunds.com

June 8, 2007

DETROIT — The challenge was to take a Chevrolet Equinox and create the ultimate green biofuel-powered hybrid vehicle, all while retaining its "consumer appeal." So an engineering team from Mississippi State University used a 1.9-liter direct-injection turbodiesel fueled by B20 biodiesel to come up with a whopping 48 percent increase in fuel economy over the production vehicle.

They were declared the winners on Thursday in the annual "Challenge X" competition sponsored by General Motors and the U.S. Department of Energy. This is the third year for the competition that builds on the previous years' work. Next year, students will focus on such critical elements as reliability and durability and conduct real-world tests of their vehicles.

The 2nd-place vehicle, engineered by students at the University of Wisconsin-Madison, is also a "through-the-road parallel biodiesel electric hybrid" that uses the 1.9-liter GM diesel turbocharged engine that runs on B20. Virginia Tech rounded out the field with a 3rd-place entry that used a split parallel hybrid architecture that runs on E85 with a 2.3-liter turbo spark ignition engine.

"Students competing in Challenge X are on a quest to deliver environmentally friendly, functional and fuel-efficient vehicles that consumers want to buy," said John F. Mizroch, principal deputy assistant secretary at the U.S. Department of Energy's Office of Energy Efficiency and Renewable Energy.

What this means to you: These are the young minds that will be creating your future hybrids.

Driving impressions of Challenge-X competitors

Auto Blog Green & Envautomental (blog)

By: Sam Abuelsamid

June 11, 2007

At the award press conference for Year three of the Challenge-X competition General Motors provided the opportunity for attendees to ride and drive in some of the competitor vehicles. I had time to drive the vehicles from Michigan Tech University, University of Wisconsin-Madison and the Ohio State University. The UWM and OSU vehicles both used the same 1.9L Opel diesel engine as the winning team from Mississippi State. The Michigan Tech team used a Ford 2.0L gas engine.

All three vehicles used a through-the-road hybrid configuration. That means that the internal combustion engine drove the front wheels through a conventional automatic (MTU, OSU) or manual transmission (UWM) while an electric motor drove the rear wheels. The only mechanical connection between the ICE and electric drives is through the tires and road.

The MTU and OSU vehicles also had a belt-alternator starter system similar to the GM mild-hybrid system on the production Saturn Vue and Aura. The Michigan Tech vehicle started off in electric mode pulling away from a stop silently before the engine fired up once we were in motion. The engine started up smoother than some of the production hybrids I've driven recently. The team from northern Michigan finished 11th overall and lagged behind in areas like handling, emissions and fuel economy.

The Ohio State team finished fourth overall and their diesel-powered machine and scored well in the handling, acceleration and on-road emissions tests. Like the MTU vehicle it also had smooth engine restarts and had better low speed acceleration thanks to the torque of the diesel engine.

The University of Wisconsin team didn't use a start-stop system but apparently made up for it with their manual transmission. The UWM Equinox had basically the same drivetrain as the winning vehicle including the engine, transmission, motor and battery. The cheeseheads finished second overall and performed consistently in most tests.

<http://envautomental.blogblog.com/driving-impressions-of-challenge-x-competitors-3674/>

Green Cars from Green Minds: College Kids Win with Biodiesel Hybrid

Popular Mechanics (online)

By: Brittany Marquis

June 11, 2007

The burden of testing advanced technology for alternative-fuel vehicles doesn't have to fall squarely on the shoulders of Detroit's engineers. Why not enlist some brilliant minds of the future help out, too? Seventeen universities just completed a key stage of the Challenge X, a four-year engineering competition charging students to design and implement a "green" biofuel-powered hybrid vehicle.

The students teamed up with GM and the U.S. Department of Energy to re-engineer the 2005 Chevrolet Equinox crossover SUV for better fuel efficiency and a reduced environmental impact, producing advanced powertrains and subsystems while maintaining the SUV's practicality. By using advanced propulsion technologies and a variety of alternative fuels—from biodiesel and ethanol to reformulated gasoline and hydrogen—engineering students can pitch into the alt-fuel revolution that has "become a global priority," says John F. Mizroch of the DOE's Office of Energy Efficiency and Renewable Energy.

The CX-winning model came from the Mississippi State University team, who concocted an all-wheel-drive hybrid-electric (pictured above) using a 1.9-liter GM direct-injection turbodiesel engine fueled by B20 biodiesel; their powertrain increased the fuel economy by an astounding 48 percent over the production vehicle. Students from the University of Wisconsin-Madison had an almost identical design and snatched second place. Another contender, Virginia Tech, was awarded third place overall with a four-wheel-drive-capable hybrid that runs on E85 ethanol with a four-cylinder, 2.3-liter turbocharged spark ignition engine.

The competition began three years ago with vehicle simulation on top of development and testing for models and subsystems. For the past two years, students have been integrating their designs into the Equinox. In the upcoming, final year of Challenge X, the focus shifts to customer acceptability as well as on-road reliability and durability in real-world situations.

Rose team earns awards for community outreach, technology design

Terre Haute Tribune Star

June 12, 2007

TERRE HAUTE— A team of Rose-Hulman Institute of Technology engineering students reaped top honors for community outreach and technical merit after concluding the third year of the Challenge X: Crossover to Sustainable Mobility, North America's premier college-level automotive engineering competition.

Awards were presented on Thursday at the Detroit Renaissance Center in downtown Detroit, Mich., after a week of vehicle dynamic testing and technical presentations at General Motors' Milford (Mich.) Proving Grounds.

Rose-Hulman received the Outstanding Outreach Award and The MathWorks' Crossover To Model-Based Design Award, while placing second for Freescale Semiconductor's Silicon On The Move Award and third for National Instruments' Most Innovative Use of Graphical System Design. Earlier, Challenge X team member Kristina Lawyer earned the Incoming Women In Engineering Award. The team received \$4,750 from Challenge X sponsors for its award-winning efforts.

Overall, Rose-Hulman placed 14th out of 17 teams in the competition.

The contest followed GM's real-world Global Vehicle Development Process to design, develop and integrate advanced technology solutions into a Chevrolet Equinox, a GM crossover sport utility vehicle, that increased energy efficiency and reduce environmental impact. The teams used a variety of alternative fuels, including biodiesel (B20), ethanol (E85), reformulated gasoline and hydrogen.

The Challenge X competition's outreach program used various strategies to raise awareness about critical energy and transportation-related issues throughout North America. The program specifically challenged teams to focus their outreach efforts on K-12 students, local community and local news media. This year, particular emphasis was placed on securing media coverage in the team's local markets.

Rose-Hulman's community outreach efforts included a public education display outside the RCA Dome before an Indianapolis Colts football game, vehicle demonstrations at several Vigo and Clay county schools and a Ride-and-Drive event with Rose-Hulman President Gerald Jakubowski. The team's outreach efforts were organized by team members Jama Johnson and Javid Khan, and associate team advisor Corena Herniter.

The MathWorks' Award recognized teams that exhibited the most creative application of The MathWorks software products, including MATLAB and Simulink, to help achieve the overall competition objectives for the third year. Teams were evaluated on how well they applied model-based design with The MathWorks toolset to help achieve the overall competition objectives in the areas of plant modeling, controls design and tuning, data analysis and visualization, hardware implementation, the overall development process they followed, the quality of their presentation and lessons learned.

"Our use of model-based system design to develop our (vehicle) controller really paid off," admitted faculty co-advisor Marc Herniter, associate professor of electrical and computer engineering. "Our students have a lot of experience with the products in the sponsor awards. I was very impressed with their presentations."

Team member Ben Ciavola, a senior mechanical engineering major, noted: "The judges were particularly interested in our use of their tools for model-based design. The system test toolbox allowed us to assess our controller's reliability and robustness and received favorable reviews."

Official news about the Challenge X event, including video and photographs, is available online at: media.gm.com/us/powertrain/en/news/events/challengex/2007/index.html

Information about Rose-Hulman's Challenge X team can be found online at www.rose-hulman.edu/challengex.

Driving Cars of the Future

GreenOptions.com & EcoGeek.org (blogs)

**article also seen on GM Inside News (online)*

By Philip Proefrock

June 12, 2007

This is part 2 of my series of posts about visiting GM Headquarters in Detroit for the Challenge X program and to meet with some GM executives. I attended this event representing both GreenOptions.com and EcoGeek.org, and these articles are cross-posted to both sites. Previous story [here](#).

Several of the vehicles were available to be driven at the Challenge X event. Of the vehicles that were there, I was most interested in driving the University of Waterloo's entry. Most of the teams (12 of the 17 competitors) were using a B20 biodiesel blend as their fuel and all but one of the others used some form of internal combustion with E85 ethanol or reformulated gasoline. But the University of Waterloo team took a different approach.

The Waterloo vehicle was powered by a hydrogen fuel cell (with onboard batteries for backup) and propelled by front and rear electric motors. When I sat down behind the wheel, my guide from the Waterloo team explained that some of the things in the vehicle that are different from the way we're used to driving a car. There were a number of different sounds, coming from the front and the rear, as various systems came online to start the fuel cell system in operation. Matt Stevens from the Waterloo team explained the whole sequence of operation to me this way:

when you first crank the key, there's no actual sounds as the no engine rank is required (or possible!)
when the key returns to on from the crank position, first is a relay clicking meaning the battery is connected and the vehicle is ready to drive. Meanwhile the fuel cells are starting up:
begins with a quiet hiss as the stacks are filling up with up with hydrogen,
next the recirculation pumps kick on, making a low hum and a very slight vibration,
last is the air delivery blower kicking up to pump air into the stacks,
and voila, 65kW of fuel cell stacks ready to deliver power. Process takes about 10 seconds, but the car is ready to drive on battery power as soon as the first click is heard and the car is put into drive.

I'm not a test driver. And even if I was, this was just a trip around the block of GM's Renaissance Center headquarters, so it was just four right turns and a couple of stops. I wasn't doing any hard maneuvering or acceleration testing, or anything else rigorous like that. Those tests had been conducted during the preceding week at GM's proving grounds. Still, I think it was a unique opportunity to have the chance to drive a fuel cell vehicle. I may not ever have one in my driveway, but I've had the chance to drive one.

While the sounds were different from what you are likely used to with an internal combustion engine, the vehicle drove no differently than any other vehicle. It responded to the accelerator in the same way as any other vehicle, and it had reasonable pickup (even with four people in the car) and performed very comfortably. If they'd left the radio in and played it during the drive, it might not have been noticeable that there was any difference at all.

I'm still uncertain about the ready availability of hydrogen, and the infrastructure to distribute it. But it's quite a thrill to drive something like this, even if it never makes it into mass-scale production. Hydrogen fuel cell power does have its uses, even if we don't see it become a mainstream automotive fuel. And, though hydrogen may be difficult to deploy across North America or Europe, it may be easier to bring it to other parts of the world, where the current fuel infrastructure is much more limited, and there is less commitment to gasoline and related fuels. So, although it's farther out there than the other entries, the design and engineering in this project are worthwhile. And even if we don't have hydrogen fuel cell vehicles in our driveways, we're likely to find some specialty applications using hydrogen as part of a comprehensive power scheme in the future. In any case, the engineering efforts of this team (and others) will be put to good use.

<http://www.greenoptions.com/trackback/7065>

Challenge X: 17 university teams on mission to create fuel-efficient, clean propulsion systems

Houston Chronicle

By: Tim Spell

June 13, 2007

There's nothing new about experimental vehicles roaming the streets of Detroit, but 17 specially prepared SUVs garnered extra attention last week. The teams who re-engineered these 2005 Chevrolet Equinoxes represent North American universities in Challenge X 2007, a competition sponsored by General Motors and the U.S. Department of Energy.

The students' missions, in year No. 3 of the four-year competition, are in sync with GM's Global Vehicle Development process. Challenge X requires competitors to develop advanced propulsion technology that increases their vehicles' energy efficiency and reduces environmental impact.

Approaches in accomplishing these goals vary, with students selecting from a list of alternative fuels, including biodiesel (B20), ethanol (E85), hydrogen and reformulated gasoline.

Most of the vehicles are propelled by a parallel hybrid system, featuring an internal combustion four-cylinder engine teamed with an electric motor (or two) to provide added torque. During times such as highway cruising, when there's low demand on the engine, the parallel hybrid can utilize the engine to charge the nickel-metal hydride battery pack. One team, the University of California at Davis, uses plug-in hybrid technology boasting an all-electric range.

Winners are announced following a day of evaluations at GM's Milford, Mich., proving grounds. Vehicles are judged for fuel economy, emissions, handling, braking, acceleration, drivability, trailer towing and traction control.

Topping the field is Mississippi State University, which uses parallel hybrid electric vehicle technology. Propulsion is generated by an electric motor paired with a biodiesel-fueled 1.9-liter GM direct-injection turbodiesel. This system boosts fuel economy 48 percent over the production vehicle's. Second-place winner, the University of Wisconsin-Madison team, generates attention with its extra dose of showmanship. Team leader Becky Gunn totes Bessie, a large inflatable cow mascot, and the team's vehicle wears No. 17, which along with the vehicle's race-car paint scheme, honors NASCAR driver and Wisconsin native Matt Kenseth.

The Wisconsin team's Equinox has a parallel electric hybrid system with a GM 1.9-liter turbodiesel engine fed by biodiesel. Gunn said the fuel is ultra-low-sulfur diesel mixed with a 20 percent soybean base.

"It's like putting vegetable oil in the car," she said, noting the powertrain gets the gas equivalent of 34 miles per gallon.

Last year's winning Challenge X team, Virginia Tech, nets third-place honors. Powering the Virginia Tech Equinox is a split parallel hybrid system with 2.3-liter turbo-spark ignition Saab engine running on E85 fuel. The system also features dual electric motors and 288-volt battery pack for energy storage.

Three teams — Texas Tech University, University of Tulsa and Pennsylvania State University — venture into the world of hydrogen, using it as a supplementary or secondary propulsion source.

The Texas Tech vehicle runs off a basic Saturn Vue Green Line parallel hybrid system, with the electric motor teamed with an E85-fueled 2.4-liter Ecotec engine. Highlighting the team's re-engineering efforts is a hydrogen fuel cell, fitted in the rear, which is used for powering accessories such as the air-conditioning and power-steering systems.

Texas Tech team faculty advisor Timothy Maxwell said hydrogen also is used for cold starting (about a 30-second boost) because E85 "hates cold," and for fuel efficiency while cruising.

Injecting hydrogen into its vehicle's GM 1.3-liter turbodiesel helps the Penn State's post transmission parallel hybrid achieve the competition's lowest nitrogen-oxide emissions levels. The team's resourcefulness also is shown via the creation of a custom helical double-reduction transaxle and titanium front brake rotors. Team leader Tim Cleary, who designed and crafted the slit-and-vented rotors, said they weigh 6 pounds vs. 18 pounds for the stock rotors.

Reducing aerodynamic drag is an element in the Michigan Technological Institute vehicle's design. One of its flair-follows-function additions is a set of body-colored fender skirts shrouding the rear wheels.

Larry Burns, vice president of GM Research and Development, said, the alternative fuels and engineering approaches used by the students are in line with GM strategy and thinking. Burns said the real-world training from Challenge X makes the students very marketable.

"In fact, GM has already hired 40 students from the first two years of competition, and we intend to extend several offers at the conclusion of this year's program."

In 2008, the fourth and final part of the Challenge X competition, vehicles will be subjected to the challenges of real-world conditions via an East Coast road rally.

Next Gear

PodTech.net (features video blogs)

By: Matt Kelly

June 13, 2007

Interview with Chris Witt, Mississippi State

<http://www.nextgearshow.com/1760/challenge-x-winner>

Challenge X: Year 3 Awards

<http://www.nextgearshow.com/1759/challenge-x-year-3-awards>

Blogger Interview with GM's Mickey Bly

<http://www.nextgearshow.com/1757/blogger-interview-with-gms-mickey-bly>

*The interview focuses on Challenge X, hybrids and the Saturn Vue

Interview with Andy Frank

<http://www.podtech.net/home/3327/andy-frank-at-challenge-x>

Interview with GM's Nick Zielinski & Dr. Gary Smyth

<http://www.nextgearshow.com/1758/blogger-interview-with-gms-nick-zielinski-dr-gary-smyth>

Interview with University of Waterloo Team

<http://www.nextgearshow.com/1762/challenge-x-uwaft-co-team-leader-mike-wahlstrom>

Interview with Texas Tech team

<http://www.nextgearshow.com/1763/challenge-x-team-texas-tech>

Winner Of GM/DOE Challenge X Announced

IndustryWeek

By: Brad Kenney

June 14, 2007

General Motors (GM) and the U.S. Department of Energy (DOE), lead sponsors for the Challenge X: Crossover to Sustainable Mobility engineering competition, recently awarded students from Mississippi State University top honors at the third annual competition.

The Mississippi State team was among 17 universities from across North America that have re-engineered a 2005 Chevrolet Equinox crossover SUV using advanced propulsion technologies that increase fuel efficiency and reduce environmental impact while retaining its consumer appeal.

The Mississippi State team designed a through-the-road parallel hybrid electric vehicle with a 1.9-liter GM direct injection turbo diesel engine fueled by B20 biodiesel. It achieved a 48% increase in fuel economy over the production vehicle.

The second place vehicle, engineered by students at the University of Wisconsin-Madison, is also a through-the-road parallel biodiesel electric hybrid design with a 1.9-liter GM diesel turbocharged engine that runs on B20. Virginia Tech was awarded third place overall with a split parallel hybrid architecture that runs on E85 ethanol with a 2.3-liter turbo spark ignition engine.

GM has already hired 40 students from the first two years of the competition, and other Challenge X sponsors, including Caterpillar, National Instruments, Freescale Semiconductor, Johnson Controls and MotoTron, also have hired students out of the program.

Here are some additional highlights of the Challenge X vehicles:

Twelve teams are using biodiesel fuel (B20).

- The University of Waterloo has a dedicated hydrogen fuel cell for its primary propulsion source, and as a result, their vehicle emits zero emissions from the tailpipe. The team is using compressed hydrogen.
- Three teams - Pennsylvania State University, Texas Tech University and the University of Tulsa - are using hydrogen as a supplementary or secondary propulsion source. Penn State is injecting hydrogen into their vehicle's diesel engine as an emissions abatement strategy. The Texas Tech and Tulsa teams are using hydrogen to power auxiliary systems for their vehicles.
- The University of California at Davis is the only team to use plug-in hybrid technology for the energy source within their Challenge X vehicle. Their vehicle has an all-electric range on battery power.
- The University of Michigan Challenge X team has developed a hydraulic hybrid, which stores pressurized fluid in large tanks from which the vehicle can extract or store energy

much like a battery electric hybrid stores energy recovered from regenerative braking. Their vehicle also uses the electrical energy to propel the vehicle on electric-only power.

- Two teams, Ohio State University and Virginia Tech, are using belt alternator/starter technology for an electric performance assist in their vehicles.
- West Virginia University and the University of Akron are using ultracapacitors to source high levels of power for short periods of time and still recapture energy from braking. Ultracapacitors are more robust than batteries and can source more energy in operations, but can not store as much energy as a traditional battery.
- The first year of the program, which began in 2004, focused on vehicle simulation and modeling and subsystem development and testing. In years two and three, students have been integrating their advanced powertrains and subsystems into the Chevrolet Equinox. In the fourth year, students will focus on customer acceptability and over-the-road reliability and durability of their advanced propulsion systems with real-world evaluation outside of the laboratory and proving ground environment.

The 17 teams participating in Challenge X include:

- Michigan Technological University
- Mississippi State University
- The 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

Additional information about the Challenge X competition is available on the Web at <http://media.gm.com/us/powertrain/en/news/events/challengex/2007/index.html>



Appendix 1
Complete Print Clips
(includes hard copy clips)



Appendix 2
Complete Online Clips
(includes hard copy clips)