The Innovators Educational Foundation (IEF) is a non-profit 501c3 organization that was formed in the fall of 2009 to carry on the American Solar Challenge mission. IEF currently hosts two events: Formula Sun Grand Prix, a solar car track event, and the American Solar Challenge, the solar car road event.

A core group of dedicated volunteers, mostly former competitors, provide the engine for IEF. They know first-hand the value of a hands-on, multidisciplinary, innovative project to the education experience.

In addition to experiential learning, these solar car events promote energy efficiency and raise public awareness of the capabilities of solar power.

We appreciate your interest in the sport of solar car “raycing” and look forward to seeing you on the road!

Support all of the teams with your donation to IEF!

Become a Sponsor Now for the 2011-2012 season

* Multiple corporate donation levels and opportunities

* Host the start/finish line dinner to speak to all the teams

* Showcase your company on in-kind product donations

* Individual donations accepted securely through the website www.americansolarchallenge.org

Contact Us
Innovators Educational Foundation
PO Box 2368
Rolla, MO 65402
ief@americansolarchallenge.org

www.americansolarchallenge.org
On behalf of the teams, staff, and sponsors, welcome to the 2010 American Solar Challenge!

Beginning with Sunrayce 1990, this year marks the 20th anniversary of solar car racing events in North America. Designs and technologies have evolved over the years and these teams continue to show just how far a solar car can go.

ASC is a unique competition which promotes educational excellence and celebrates engineering creativity all while fueled by the spirit of friendly competition, teamwork, and, of course, the sun. Each team designs and builds a solar-powered vehicle within a set of rules, which then must pass a series of inspections and successfully complete a track qualifier to prove the roadworthiness of the vehicle. Qualifying for ASC is an accomplishment in itself.

Once the green flag drops at the start line in Broken Arrow, OK on June 20, teams follow a pre-defined 1200-mile route, finishing in Naperville, IL on June 26. The route is broken into a series of stages with mandatory stops along the way to interact with the public and media as well as check-in with event staff for timing purposes and updates.

To finish the Tour of the Midwest route, teams will face hilly terrain, normal traffic conditions, and unpredictable weather all while carefully managing their power. Winning this brain sport is a combination of a reliable car, efficient driving, and a good strategy to get you the checkered flag.

More than just ENGINEERING

The challenge of ASC begins long before the solar cars hit the road. A solar car team really acts as a small business – attracting sponsors, managing public relations, developing and executing a two-year plan, and producing a solar car. While most teams have many engineers, you will also find majors in business, marketing, art, and other fields. The solar car team multidisciplinary experience serves these students well as they graduate and prepare for their careers.
The 2010 Rayce Season

Scrutineering

June 12-15, Motorsport Ranch, Cresson, TX

After months of designing, building, and testing, solar car teams arrive for scrutineering. For four days, the solar cars will undergo a series of inspections covering all aspects of the car: mechanical systems, electrical systems, body and sizing, and dynamic testing. Inspectors in each area make sure the solar cars are built in alignment within the regulations and have all safety features in place. Teams must pass all stations in order to compete in Formula Sun Grand Prix and the American Solar Challenge.

Scrutineering is also about testing the abilities of the drivers. All drivers must pass the egress test, which requires drivers to get out of the car unassisted in 10 seconds or less. Drivers are randomly selected to complete the dynamics tests, which are as much about testing the car’s braking, turning, and stability as it is about testing the experience of the drivers.

June 16-18, Motorsport Ranch, Cresson, TX

To qualify for the American Solar Challenge, teams must successfully participate in Formula Sun Grand Prix (FSGP). FSGP is a 3-day track race, where the most laps completed wins. For qualifying purposes, teams are required to complete a minimum number of laps on the 1.7 mile track.

The tight turns test the car’s stability and driver’s skill. Only cars (and drivers) that prove reliable and safe on the track are permitted to participate in the on-road event, the American Solar Challenge. FSGP also provides practice for the team’s pit crew in changing flat tires and troubleshooting issues with the car. Teams can use this time to learn from one another and borrow supplies—sportsmanship and teamwork are strongly encouraged!

Raycing

June 20-26, Broken Arrow, OK to Naperville, IL

The teams that make it into the American Solar Challenge (ASC) have already completed quite a challenge. What lies ahead of them is 1200 miles of road across the Midwest. The team that completes the route in the lowest overall elapsed time wins.

Teams rayce during the day, between the hours of 9am – 6pm. Each solar car is escorted by a lead and chase vehicle that carry the other team members and equipment for roadside repairs. Teams are provided a detailed route book with step-by-step instructions and maps. The route is broken into stages, and teams are required to stop at all checkpoints and stage stops along the way.

For two hours in the morning and evening, teams are able to charge their batteries using the solar car’s array. Many teams have an array stand to angle the solar array toward the sun for maximum exposure. Teams also use these non-raycing hours to perform maintenance on the car, check the weather, determine their strategy for the next day, and hopefully get some sleep!

June 20
Start Line | Broken Arrow, OK
Bass Pro Shops

Checkpoint | Neosho, MO
Crowder College

June 21
Stage Finish | Topeka, KS
Downtown Ramada Inn

June 22
Stage Start | Topeka, KS
Downtown Ramada Inn

Checkpoint | Jefferson City, MO
Missouri State Capitol

June 23
Stage Finish | Rolla, MO
Missouri S&T

Checkpoint | Alton, IL
Lock and Dam

June 24
Stage Start | Rolla, MO
Missouri S&T

Checkpoint | Normal, IL
Illinois State University

June 25
Stage Finish | Normal, IL
Children's Discovery Museum

Finish Line | Naperville, IL
Naperville North High School

Awards Ceremony | Naperville, IL
North Central College, Wentz Hall
17 teams are registered for the 2010 season, with all but one planning to compete in both Formula Sun Grand Prix and the American Solar Challenge. We welcome our international teams from Canada, Germany, and Taiwan as well as the strong presence of our local United States teams. Safe travels, sunny days, and all the best to all the teams!

**Northwestern University**
**Nusolar sc5**
- **Weight:** 624 lbs
- **Batteries:** Mono Silicon (Sunpower A-300)
- **Chassis:** Carbon Fiber
- **Motor:** NGM

**University of Michigan**
**Infinitum**
- **Weight:** 700 lbs
- **Solar Cells:** Encore AT1/RTJ
- **Batteries:** A123 Lithium Ion Phosphate
- **Chassis:** Carbon Fiber
- **Motor:** CSIRO

**University of Kentucky**
**Gato del Sol IV**
- **Weight:** 450 lbs
- **Solar Cells:** Encore AT1
- **Batteries:** AA Portable Power High Power Li-Po
- **Chassis:** Spaceframe 6061 Al Tubing
- **Motor:** NGM SCM

**Illinois State University**
**Mercury III**
- **Weight:** 624 lbs
- **Solar Cells:** China Sunergy
- **Batteries:** 1080 sub-c Ni-MH
- **Chassis:** Chromoly steel tube frame
- **Motor:** Power Tec

**Iowa State University**
**Anthemion**
- **Weight:** 460 lbs
- **Solar Cells:** SunPower A-300
- **Batteries:** Samsung Li-Ion SDI 18650-26C
- **Chassis:** Aluminum space frame
- **Motor:** NGM/SCM150

**Hochschule Bochum**
**SolarWorld No.1**
- **Weight:** 483 lbs
- **Solar Cells:** AZUM SPACE 3G Gallium Arsenide
- **Batteries:** Sony UR10650F
- **Chassis:** Carbon Fiber
- **Motor:** NGM

**University of New Mexico**
**Lobo del Sol**
- **Weight:** 700 lbs
- **Solar Cells:** Advent Venture
- **Batteries:** Werker Lead-Acid WKA12-33C-J
- **Chassis:** Steel
- **Motor:** Vectrix

**University of Colorado**
**Schulich Axiom**
- **Weight:** 375 lbs
- **Solar Cells:** Encore ATG Gallium Arsenide
- **Batteries:** Kokam Lithium Polymer
- **Chassis:** Chromoly Steel
- **Motor:** NuGen SCM

**University of Texas at Austin**
**Solar Solorean**
- **Weight:** 441 lbs
- **Solar Cells:** Sunpower C50
- **Batteries:** MANNA Li-Po
- **Chassis:** Carbon Monocoque
- **Motor:** NGM SCM150

**National Kaohsiung University**
**Apollo VI**
- **Weight:** 284 lbs
- **Solar Cells:** Gacs
- **Batteries:** Lithium Ion Polymer
- **Chassis:** Carbon Fiber
- **Motor:** MITSUBA-M20960-II

**State Univ. of NY New Paltz**
**SUN Hawk**
- **Weight:** 503 lbs
- **Solar Cells:** SunPower C-50 silicon
- **Batteries:** LifePo4
- **Chassis:** Tubular aluminum
- **Motor:** NuGen 30-150

**University of Minnesota**
**Centaurus 2**
- **Weight:** 400 lbs
- **Solar Cells:** China Sunergy
- **Batteries:** BAK Lithium Polymer
- **Chassis:** Fiberglass Composite
- **Motor:** NGM

**University of Waterloo**
**Midnight Sun**
- **Weight:** 378 lbs
- **Solar Cells:** Encore Triple Junction Gallium Arsenide
- **Batteries:** EEMH Lithium Polymer
- **Chassis:** Monocoque
- **Motor:** CSRD hub motors (2) FW drive

**Western Michigan University**
**Sunseeker**
- **Weight:** TBA
- **Solar Cells:** Sunpower A-300
- **Batteries:** LimePolymer
- **Chassis:** TBA
- **Motor:** NGM SCM-150

**University of Kentucky**
**Gato del Sol IV**
- **Weight:** TBA
- **Solar Cells:** Sunpower A-300
- **Batteries:** LimePolymer
- **Chassis:** TBA
- **Motor:** NGM SCM-150

**Oregon State University**
**Odyssey**
- **Weight:** 450 lbs
- **Solar Cells:** SolarWorld A-262 Monocrystalline Si
- **Batteries:** Trusefire Li-Ion
- **Chassis:** Titanium
- **Motor:** NGM SC-M100

**Iowa State University**
**Anthemion**
- **Weight:** 460 lbs
- **Solar Cells:** SunPower A-300
- **Batteries:** Samsung Li-Ion SDI 18650-26C
- **Chassis:** Aluminum space frame
- **Motor:** NGM/SCM150

**University of Michigan**
**Infinitum**
- **Weight:** 700 lbs
- **Solar Cells:** Encore AT1/RTJ
- **Batteries:** A123 Lithium Ion Phosphate
- **Chassis:** Carbon Fiber
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Understanding the Lingo: Talk like a Solar Car Raycer

**Raycing** is a term used for our solar car events, which involve using the sun’s rays to complete the race. It is a play on words that is unique to this sun-powered sport.

**Charging** typically refers to the time in the morning and evening that is designated time to point the solar array towards the sun and charge the batteries. Any extra power the team has as they go down the road can also be put into the batteries for charging on the road.

**Trailering** occurs when a team cannot reach the next stage/checkpoint in the allotted time. The solar car is loaded onto a trailer. Time penalties are in place to discourage trailering.

**Impound** means that the batteries are removed from the car and kept under the control of the observer to make sure they are not externally charged. Batteries are impounded upon arriving at a stage stop and every night from 8pm to 7am the following morning.

**Body** is the aerodynamic shell of the car holding the solar cells.

**Chassis** is the structural frame of the car forming the driver cockpit.

**Official Elapsed Time** represents the calculated time for each team in completing the American Solar Challenge. This time includes driving time, checkpoint credits, and trailering and other penalties. The team with the lowest Official Elapsed Time wins, therefore the first team to cross the finish line is not necessarily the winner!

**“Don’t Shade the Array”** is a reminder to watch your shadow when near the solar car during charging. Casting a shadow on any portion of the solar array will decrease the energy available to be stored in the batteries.

**“Spray the Array”** is the action of misting the array with distilled water to cool down the solar cells for more efficient charging.

**“Check the Ballast”** occurs when a new driver gets in the solar car. Drivers are weighed during scrutineering and given ballast to make the driver weight equivalent to a minimum of 176 lbs. Colored coded wristbands and ballast bags are used to verify the correct weight is in the solar car.

**Lead** is the vehicle in front of the solar car, responsible for navigation.

**Chase** is the vehicle behind the solar car, responsible for protection Lead, solar car, and chase make up the solar car caravan. Many teams have a **scout** vehicle which travels the route several miles ahead of the caravan to check weather and road conditions.

**The Wilson Cup**

The Wilson Cup is the traveling trophy for the American Solar Challenge. The winning team of the road event gets to take home the Wilson Cup and display it until the next road event.


This year’s winners will be added with more space for the tradition to continue!

THANK YOU to our 2010 SPONSORS!
A Typical Day on ASC…

Day 1, 7:00 AM – Batteries are released from impound and morning charge time begins.

9:00 AM – Wait for the green flag to drop. Teams are released in 1-minute intervals.

During the day – drive, drive, drive…and only if needed, stop to charge, fix a flat, change drivers.

Reach a Checkpoint – the team jumps out, points the solar array towards the sun, and takes a much needed restroom break. Drivers of support vehicles go off to find the nearest fuel station. Observers are swapped, route updates are given, and the public gathers around to see the cars. After staying the allotted time, 3…2…1..and they’re off again.

6:00 PM – 9-hours after the green flag, the racing day ends and evening charge time begins. Teams have a 45-minute window to find a safe place to stop.

8:00 PM – Battery impound, work on the car (minus batteries), find lodging, eat dinner, call HQ, and get ready for the next day.

Day 2 is much the same, except that it ends at a stage stop where all teams will meet together for stage awards and camaraderie.

Like ASC? Check out FSGP!

Formula Sun Grand Prix is a 3-day track race held on a road course track. FSGP also serves as the qualifier for ASC, requiring teams to demonstrate the reliability and stability of the car on the track. On off-ASC years, FSGP is a great way to educate new team members.

In Appreciation of our Volunteers

ASC 2010 would not be possible without our volunteers. Many have been with the event since the early years of Sunrayce and we continue to thank them for their dedication to the teams and the event!

Rayce Officials

The green shirts identify the officials, who perform a variety of roles from inspectors to stage/checkpoint crews to our route advance team and on-road EMTs. Many are also involved in the prep and planning work prior to the event and reviewing the technical design reports submitted by the teams.

Dan Bohachick
Brian Call
Steve Day
Mark Eudaly
Sue Eudaly
Geoff Heavin
Paul Hirtz
Steve Hunt
Gail Lueck
Marie McMullen
Steve McMullen
Bernie Neidert
Dick Roberto
Steve Rummel
Andrew Rutgers
Dan Saulsberry
Grant Smith
Ryan Smith
Greg Thompson
Jim Williams

Observers

Observers wear orange shirts and volunteer to spend a week on the road living and traveling with the teams. Their role is to ride in the chase vehicle, monitor the solar car’s progress, and ensure batteries are impounded at the appropriate time. Observers are the eyes and ears for the staff and get to experience first-hand the hospitality of the teams.

Dennis Bearden
Andre Carplaux
Rita Crocker
Taylor Fontenot
Chloe Gibbons
Dustin Grue
Jimmy Hack
Kila Henry
Brian Kamusina
Jordan Littlejohn
Patrick Markan
Bill Mayberry
Robert Rieffel
Jeff Sharp
Bill Stilwell
Alisa Vancel
Louis Werner

Additional thanks to the following staff who could not join us on the road but helped make ASC 2010 possible:
Dan Eberle, Jason Kramb, and Cheryl Williams

Special thanks to all of the local hosts responsible for organizing the stage/checkpoint locations and activities.

Solar Car FAQs

How do solar cars work?
Solar cars are very similar to electric vehicles, except that they utilize energy straight from the sun as opposed to a battery charger. Solar cells on the car convert sunlight into electricity, which in turn powers an electric motor to run the vehicle.

Do the cars have air conditioning?
Though teams are required to provide ventilation for the driver, these are racing vehicles. Air conditioning, radios, power windows, and other creature comforts would only consume electricity without improving the car’s performance.

What about those not-so-sunny days?
Solar cars carry batteries that can be charged using the solar cells. When facing clouds or needing extra power, the car uses this stored energy.

How fast can they go?
Teams must obey posted speed limits. Regulations limit them to 65 mph. During testing, solar cars have been clocked at over 100 mph.

Why do they look so different?
Conventional passenger cars spend more than 85% of their energy overcoming air resistance, known as aerodynamic drag. Solar cars are designed to minimize the energy lost to drag, resulting in some unique shapes.

Do solar cars have engines?
Instead of an internal combustion engine, most cars use a small electric motor mounted inside one of the wheels. Motor efficiency is typically over 90%.

Can I buy a solar car?
These solar cars are built specifically for events and are not suitable for the general public. However, you can buy hybrid electric vehicles or vehicles that run on ethanol, natural gas, or other cleaner fuels.


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