SOL INVICTUS

ANU World Solar Challenge
An introduction to our team
Dear Prospective Sponsor,

Sol Invictus (Latin for Unconquered Sun) is the Australian National University College of Engineering and Computer Science’s (CECS) solar racing collective. We are a non-profit organisation operated by a group of dynamic, highly motivated students with a diverse range of backgrounds working in interdisciplinary teams to compete in the 2017 World Solar Challenge (WSC) and beyond.

The WSC is an internationally renowned solar car race that sees teams from prestigious institutions around the world design and race solar cars along the 3000 km route from Darwin to Adelaide. Receiving media attention from around the world, it also serves as a valuable opportunity to learn and observe different ways that technological innovation can work towards improving the sustainability of our energy practices.

As a sponsor, you will play a vital role in supporting our endeavours to create ground-breaking alternative solutions for human transport. Whether it be financial, in-kind or in the form of professional assistance, any and all contributions are of paramount importance in helping our team achieve our ambitious goals. In return, we reciprocate the kindness of our sponsors through channels including publicity, merchandise and a range of other options further outlined in this package.

The Sol Invictus team seeks to establish productive long-term relationships with our sponsors. We greatly encourage you to contact our team with any feedback or queries and to let us know how we may accommodate your needs.

We would like to invite you to join us in our endeavour to conquer the Sun’s energy.

Kind Regards,

The Sol Invictus Team
The biennial WSC is regarded as one of the world’s most prestigious solar racing competitions, and with good reason. Teams must design and construct electric vehicles (EVs) with the aim of completing the race with the highest average speed, using sunlight as the only source of fuel. The route extends for a gruelling 3000km from Darwin to Adelaide, through the harsh Australian outback.

The competition attracts almost 40 teams, ranging from universities to technical institutes and private enterprises which include prestigious institutions such as Stanford, MIT and Cambridge. This high calibre of competition helps to attract significant global media attention to the WSC.
About us

Team Culture

The Sol Invictus team is built to innovate, synthesising a highly diverse range of backgrounds ranging from engineering and science through to commerce and law. The team consists of all undergraduate students, split into a Project Team, Technical Team, Operations Team, Business Team and Administrative Team. This core group is supported by the ANU Solar Car Association (ASCA), which serves as the interface between Sol Invictus and the wider student body.

Our overarching vision for 2017 WSC is to complete the entire competition route amongst the top 10 teams and to compete for the title of Australia’s premier solar car team.

Goals

Create a professional working culture aligned with our team values.
Build long-lasting and mutually beneficial relationships with our partners.
Foster intensive collaboration between our sponsors and the ANU To be accountable to our sponsors.

Team Values

Committed
Deeply invested in ensuring the success of Sol Invictus.

Cooperative
Nurture, our relationships.

Dedicated
Ensure the Sol Invictus project continues into the future.

Motivated
A team that passionately believes in the value of Sol Invictus to both the local and global community.

Transparent
Be open and honest when communicating with others.
“The ANU’s Sol Invictus racing team will compete for the first time in 2017, and we are keen to set up a team that will push the boundaries of what is possible for undergraduate students. We will apply new ANU research to solar vehicle technology and race in a professional manner. This will allow for students to get the most out of the opportunities provided. The Technical Team will be responsible for designing, building and testing the solar vehicle with all available resources, as well as working with stakeholders to develop the design and construct race critical systems. The Technical Team of 2017 is under the additional mandate to maximise the chances of race completion, as a successful race in 2017 will prove that the Sol Invictus team has what it takes to make an impact on the solar racing scene in future years.”

Jack Allison – Technical Team Lead

“The ANU World Solar Challenge Team is the College of Engineering and Computer Science’s flagship extracurricular initiative that brings together the greatest minds and hardworking students together to compete on an international level. We’ve put together a world class team which has taken all the necessary steps to ensure we compete in 2017 with the utmost build quality and teamwork that can represent our valued partners and the ANU, one of the top 20 universities in the world.”

Alan Babaei – Project Director
Electrical Subsystems

Sol Invictus plans to design and construct the entire electrical system with assistance provided by industry sponsors.

Solar Panels:
Solar panels are one of the most popular ways to harness solar energy. They work by using energy provided by sunlight to drive electrons through a circuit, providing power. Silicon-based solar panels are a common choice for teams due to their availability and relatively cheap manufacturing costs. Multi-junction solar arrays, usually confined to aerospace and extra-terrestrial applications due to cost, have also been used by highly funded competitors in the past.

We at Sol Invictus will work with industry sponsors to create high quality solar panels to provide power to our EV. For the 2017 WSC, we plan to use contemporary encapsulated silicon solar panels, which will provide power in a robust package. In future we will consider using solar concentration and alternative solar capture technologies in collaboration with the ANU’s world-leading solar research group.

Battery:
Batteries play a vital role in managing the energy consumption of the vehicle. They should store energy when the solar panels produce excess energy, and should provide power to the EV in periods of little sunlight, such as poor weather and in the evening. It is also important to minimise the weight of the battery while maximising energy density, as the battery is one of the heaviest components of the EV.

Motor:
It will be extremely important to make sure the motor has excellent efficiency while providing enough power to generate a competitive speed. Efficiency is essential because the only source of power will be sunlight, meaning low efficiencies could cause the car to call on the battery more frequently, leading to less reserve power for low light conditions. In terms of power, it will be important to find the right balance between motor weight and motor power – excessive weight or insufficient power could both see speed suffer. At this stage, the Sol Invictus team plans on utilising in-hub motors due to their very high efficiency.

Telemetry:
Reliability is essential for the WSC, with sound monitoring systems enabling the team to identify and treat problems before they become dangerous. Combined with well-designed onboard tuning systems, this can shave hours off the race time by allowing small fixes to be made without even stopping the car!
Mechanical Subsystems

Sol Invictus will seek to design the entire EV in-house, but will outsource the manufacture of the vehicle frame to optimise construction efficiency. This manufacturing strategy will also provide our team members with the opportunity to design specifically for manufacturing processes.

Car Body:
The ideal car body design should combine high strength, low weight and excellent aerodynamic design. Strength relates to driver and vehicle safety, while weight and aerodynamics have a significant impact on fuel efficiency. The body will be engineered using Computer Assisted Design (CAD) software and, if possible, wind tunnel testing for aerodynamics.

Sol Invictus will explore the possibility of alternative aerodynamic materials with the goal of avoiding the time-consuming construction processes required for fibreglass or carbon fibre shells. We will also emphasise modular design to allow for features such as mountable wheel assemblies, enabling much faster repair processes.

Suspension:
Suspension plays two important roles in the EV. Firstly, it improves driver comfort, which is vital given the gruelling heat and terrain of the journey. Improved comfort can help reduce driver fatigue, importantly increasing the safety of the driver. Suspension also assists the vehicle when negotiating any rough terrain during the race, increasing vehicle durability and minimising hardware failure.

Race Strategy:
The WSC is, at its core, a challenge centred on efficient energy and operational management. Strategy plays a key role as teams must plan for many parts of the race, including:

- When and where to make their stops for each day
- When to raise or reduce their speed based on weather and race conditions

From a logistical perspective, it is also vital to organise contingency plans and emergency procedures for unforeseen vehicle failure and human safety scenarios, which includes aspects like:

- When and where to swap drivers
- Coordinating the tow car and remote communications
- Coordinating the maintenance crew and equipment
To produce a competitive EV for the 2017 Solar Challenge, our vehicle will require smart design, conservative construction and rigorous testing. Sol Invictus currently has a minimum budget of $250,000. This value is developed from a careful balance of reserved spending and cutting-edge technology to develop. The breakdown is shown, with technical costs associated with vehicle construction, while electrical and mechanical are dominant factors.

Marketing and outreach activities are continually conducted throughout the development period, which promotes awareness and understanding of EVs and their potential in the immediate future. Detailed research and student planning, which go into vehicle design, provide a greater understanding of the possibilities of various materials and finding the best and most efficient way to implement a design.
## Sponsorship levels and Benefits

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### General Benefits:
- Green Company Image
- Local/National/International Exposure
- Collaboration with a world-leading university
- Team Merchandise
- Invitations to attend all major team events
We’ll see you at the start line!

Team Phone Contact:

Ed Muthiah, Sponsorship Team Manager
0487 000 509