ESTEBAN
SOLAR CAR PROJECT

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SOLAR CAR TEAM

2018-2020

DRIVING ON SUNSHINE

The Esteban Project combines both creativity and perseverance toward an ambitious objective since its inception: developing the most competitive electric car powered entirely by the sun. Every year, our team must ingeniously surpass itself to build an ever more performing prototype, thus adding its contribution to the development of sustainable energy sources. Today, the Esteban Project is proud to introduce Polytechnique Montreal's latest solar car prototype: Esteban 10.

Needless to say, we could never reach our goals without the precious contribution of our sponsors, sharing our passion and our vision. Not only do our partners support an innovative technological initiative, but they also contribute to promoting science and technology both in Quebec and around the world. We believe it is our responsibility to use our project to popularize science and sustainable engineering within our community.

« The knowledge transfer and the experience acquired during the manufacturing of the last prototypes make us confident as for the realization of this large-scale project. »

Esteban 10 will be the first multi-occupant vehicle in our team history. This new design, which brings our vehicle concept closer than ever before to a consumer car layout, will change our development and fabrication process radically. Our team now faces this challenge eagerly with one event in mind to put it to the test: the American Solar Challenge 2020.

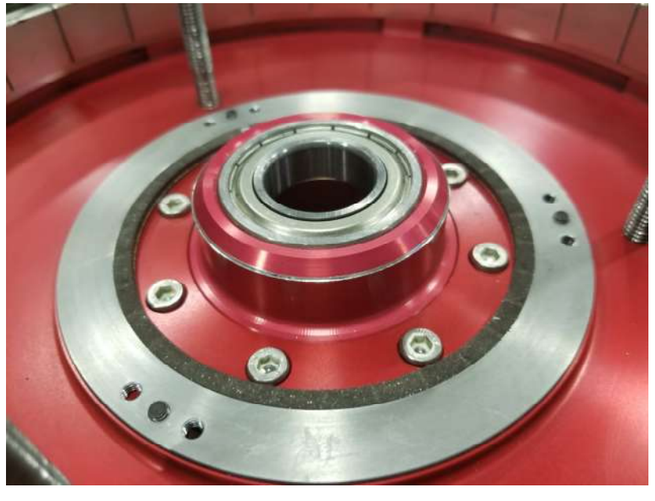
Supporting the Esteban Project is nothing less than an investment in the training of 40 students eager to innovate, and who are convinced it is possible to build a greener future. This is the reason we invite you to join our team and live this great adventure by encouraging future engineers to tackle the energy challenges of tomorrow.

INSIDE THE PROJECT : INNOVATION

By replacing our one-occupant configuration with a new multi-occupant design, the Esteban Project enters a new phase of its life, a phase which brings us closer than ever before to the world of standard consumer cars. Upgrading from one occupant to two occupants poses a substantial technical challenge, as our team must start anew its product design process. The team plans to include many new features that we would find in an everyday vehicle. From the cup holder to the phone charger, many options are considered. The mass is also a major constraint that must be considered: adding a second passenger will significantly increase the weight of the vehicle. The team will therefore need to rethink the mechanical and electrical systems.

Esteban 9 Technical Data Sheet

Dimensions	3.3 m x 1.84 m x 1 m
Weight	198 kg
Peak speed	115 km/h
Cruising speed	70 km/h
Battery pack	5 kWH (Li-Ion)
Power	0.86 kW (1.1 HP of Solar Energy) 5 kW (6.7 HP Motors)
Engine Layout	Front Wheel Drive
Autonomy	350 km



Esteban 10 : A prototype integrating advanced technologies

ELECTRICAL
Three-phase synchronous in-wheel electric motor with regenerative braking
Solar panels with monocrystalline silicon cells
Automotive standard Modular CAN network
Battery management and protection system (BPS) ensuring the safety of the car
Control system optimizing efficiency and performance
Intelligent dashboard and telemetry for real-time data analysis

MECHANICAL
Monocoque carbon fiber frame optimized by finite element methods
Composite structure manufactured by vacuum infusion and prepreg
Digital model developed by CAD
Four-wheel hydraulic braking system
Custom suspension with ajustable
Supports for electrical components manufactured in 3D printing

The electrical network constitutes the brain of the car and Esteban 10's team aim to build the entirety of the embedded systems of the prototype. This new vehicle will therefore be more efficient as well as more reliable and will allow a better analysis in real time of the performances during our competitions.

The implementation of new features in the car will encourage the team to optimize the performance of the electrical systems in order to satisfy the competition criteria and improve the practical aspect of the car.

COMPETITIONS: A MAJOR CHALLENGE

A journey of nearly 3000 km in a solar car is the challenge of the American Solar Challenge, a competition that takes place every two years in the United States. From Omaha, Nebraska to Bend, Oregon, through the Rockies, Esteban finished fourth after easily qualifying for the Formula Sun Grand Prix, where it won first place. The team also made its mark by winning the "Dynamics Award" and the "Best Electrical System Design Award".

One of the most challenging objectives of the Esteban Project is to compete against the prototypes of the most prestigious universities. To do this, the team must build a solar car that complies with the American Highway Code, since competitions are held on conventional roads!

THE PURSUIT OF THE ADVENTURE

Formula Sun Grand Prix (FSGP) 2019

Well known by the team, the Circuit of Americas in Texas will once again host the 2019 Formula Sun Grand Prix. After winning the first place at the FSGP 2018 , the team is confident to achieve the same results in 2019. Esteban 9 will thus be optimised and will be methodically tested, in order to quickly pass the qualification round and ensure its place on the podium.

American Solar Challenge (ASC) 2020

Esteban expects to arrive at the start line of the American Solar Challenge 2020 with a completely redesigned prototype. To make this tenth edition more innovative, several new features will be added to the new prototype. With its best results so far, the team is confident to produce a solar car that is both efficient and practical, delivering performance which matches that of recent years.

THE TEAM

Our group is committed to connect students from a variety of engineering programs. To do so, we have members in the fields of mechanical engineering, electrical engineering, computer engineering, industrial engineering, physics engineering, biomedical engineering and aerospace engineering who are all actively involved in the project by assisting in promotion, project management, designing, manufacturing and fundraising.

Supporting the project also means investing in the training of these future engineers who are aware of environmental issues. This is a unique opportunity to connect with student entrepreneurs who are developing highly relevant work experience by participating in this concrete and prestigious project.

BUDGET

Every year, Esteban trusts in its long-term sponsors and its constant search for new partners. Here are the estimated costs for the 2018-2020 cycle of the project.

Expenses forecast

Prototype development expenses	
Batteries	17 000
Electronic components	12 000
Steering	2 000
Braking system	4 000
Electric motors	40 000
Molds	20 000
Tooling	10 000
Solar panels	50 000
Tires	6 000
Vinyl wrap	6 000
Wheels	10 000
Carbon fiber structure	18 000
Suspension	13 000
Subtotal	**208 000**
Promotional expenses	
Events	7 500
Advertising and marketing	1 000
Team uniform	1 500
Subtotal	**10 000**

Expenses forecast (cont.)

Racing expenses	FSGP 2019	ASC 2020
Support vehicles	2 500	7 000
Fuel	3 000	3 000
Food	1 000	2 500
Lodging	2 000	6 000
Entry fees	5 000	5 000
Communication equipments	1 000	1 000
Subtotal	**14 500**	**24 500**
Total		**257 000**

MEDIA VISIBILITY

Esteban participates in several events throughout the year. Whether it is at public events, corporate exhibitions, school visits or international competitions, our team proudly displays its partners. Thus, our partners' logos are present on the car, the team uniform, the website as well as in the promotional documents.

Energy will be a key issue of the 21st century, and Esteban is an exceptional tool to raise public interest on the technologies of the future, as well as on the unique opportunities offered by the engineering and science professions.

Following the great success of the Montréal-Québec 2017 event, the team wishes to introduce a new tradition by organizing mini-rallys over the weekend, every year, in order to reproduce conditions similar to those faced by the team during the American Solar Challenge. These high-profile events are designed to promote our partners and give our new recruits a taste of what the competitions we participate in look like.

In recent years, the project has also been the subject of reports in the major following media:

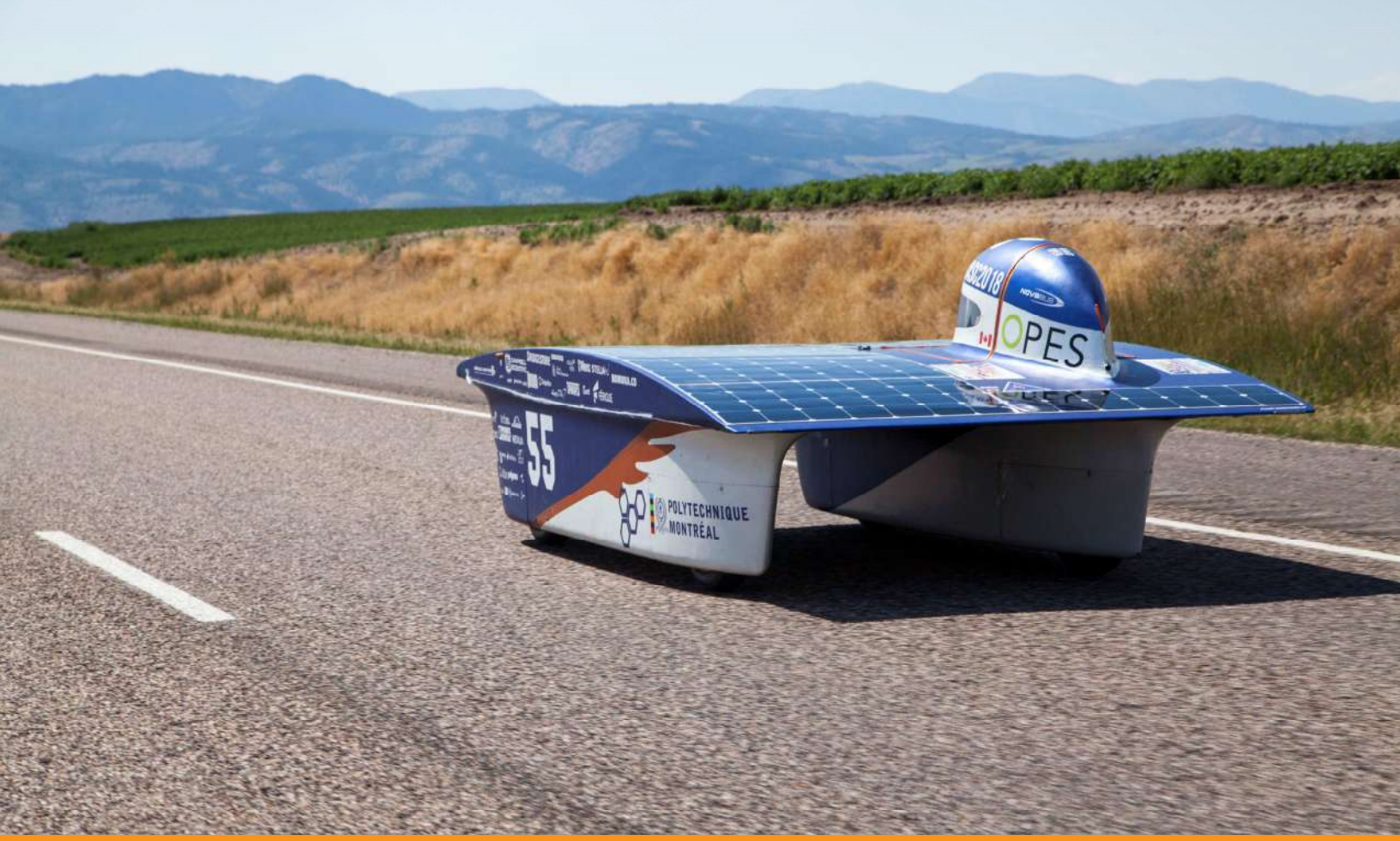
- Radio-Canada (newscast, radio, Internet)
- TVA Nouvelles
- CTV (television, internet)
- Journal de Montréal, Journal de Québec, Canoë
- 98,5 FM
- Journal Métro
- Les affaires
- PLAN magazine (Ordre des Ingénieurs du Québec)
- CBC
- La Presse
- The Gazette

* note : Press review is available on demand.

BECOMING A PARTNER

Esteban is proud to wear the colours of its partners during its numerous and diversified appearances. By supporting the project, our sponsors are granted the following benefits:

Sponsorship value	1 000 $ and -	1 000 $ and +	2 500 $ and +	5 000 $ and +	10 000 $ and +
Display on our official web page and social network					
Access to our recruiting database					
Invitation to special events					
Display on our racing trailer and on team t-shirt					
Custom information/recruiting session at Polytechnique					
Private vehicle demonstration in your company's headquarters					
Custom demonstration and road tests					
Exclusive naming and negotiable visibility					
Display size on vehicle					
Small size					
Medium size					
Large size					



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