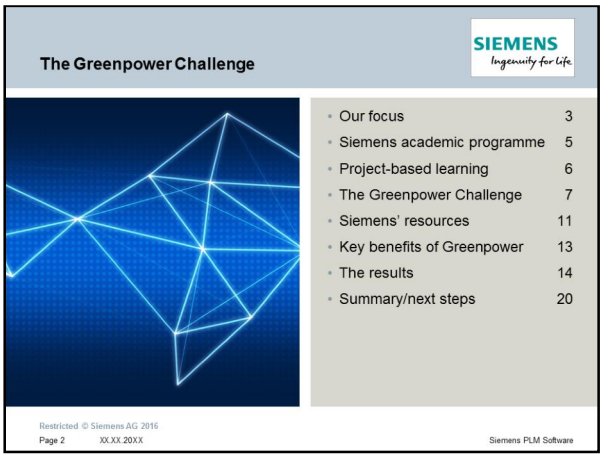
***Presenter Note*:**

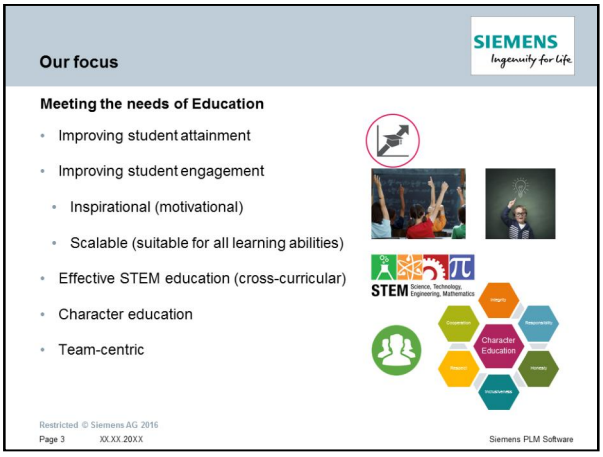
This presentation provides an introductory overview of the Greenpower Electric Car Challenge.

Please familiarise yourself with this presentation. There is a suggested script and the Presenter should communicate the key points but can adapt the narration for the audience.



Welcome.

This short presentation will provide you with an introductory overview of the Greenpower Electric Car Challenge, explain why Siemens are supporting this highly-successful project-based learning activity, and hopefully secure your agreement to participate in the Greenpower Challenge.



Siemens has been working in partnership with Education for most of our long history; our focus is to help and support the needs of Education.

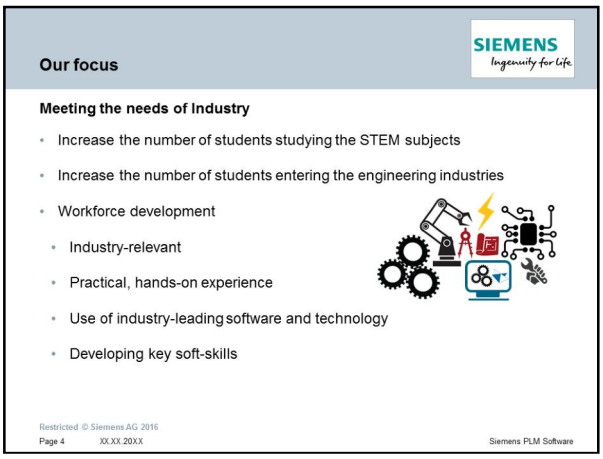
To help improve student attainment both in terms of improving grade levels but also personal and developmental attainment

We want to improve student engagement and inspire students of all learning abilities.

As a global engineering company we're focused on cross-curricular STEM education (Science, Technology, Engineering, and Mathematics)

We understand the importance of developing key soft-skills such as responsibility, respect, integrity, collaboration; often referred to as 'character education'

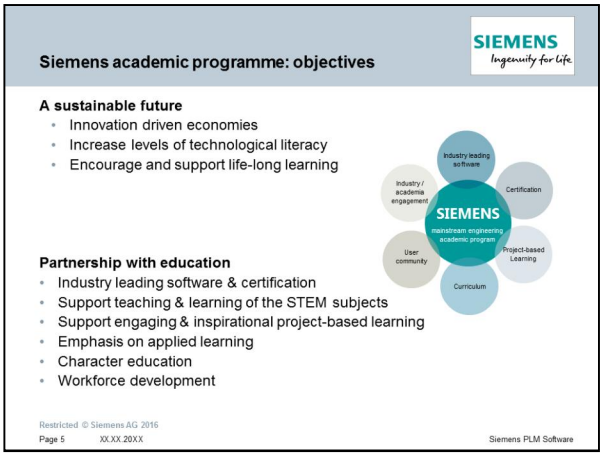
And we know how important it is for students to develop their ability to work effectively within a team.



As a global engineering company Siemens understands the need to increase the number of students studying the STEM subjects and ultimately entering the engineering industries at all levels of graduation.

It’s vital to the future of our engineering and manufacturing industries that students enter the workforce with industry-relevant skills and experience, familiar with industry-leading software and technology and with the soft-skills required by employers.

As part of our core business we’ve developed the Siemens academic programme



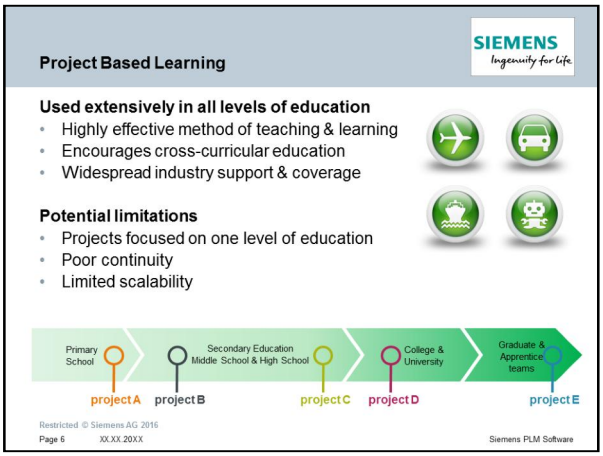
The Siemens academic programme comprises of key deliverables or activities developed to meet the needs of educators and students from elementary school through to University and Apprenticeship schemes. Our goal is to help develop innovation driven economies by increasing the levels of technological literacy within students entering the workforce and encourage and support life-long learning.

To achieve this we actively develop partnerships with education. We provide our industry-leading software and industry-recognised certification. We work to support the teaching and learning of the STEM subjects (Science, Technology, Engineering, & Mathematics).

One successful approach is by supporting industry-relevant and inspirational project-based learning with an emphasis on ‘applied learning’.

We also recognise and support “Character Education”; an umbrella term used to describe the teaching and development of key soft and social skills such as team-work, responsibility, cultural-awareness, respect, ownership & responsibility, communication and presentation skills.

We also work to develop the skills to help prepare students to enter the workforce.



Project-based learning is used extensively in all levels of education, from Primary school through to Graduate and Apprenticeship programmes.

It's a proven and highly-effective method of teacher and learning

It encourages truly cross-curriculum education and

Has widespread industry support and coverage.

However, there are some potential and frequently found limitations,

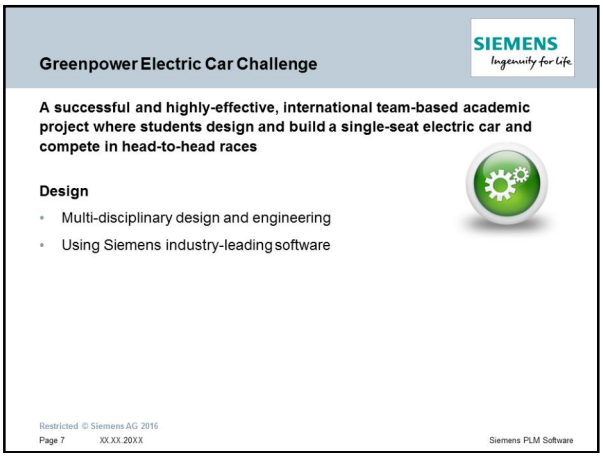
For example, projects typically focus on just one level of education

Which provides poor learning continuity

And limited scalability, both in terms of learning abilities and growth potential of students, for example; many projects are significantly limited in terms of their potential for ongoing and further development.

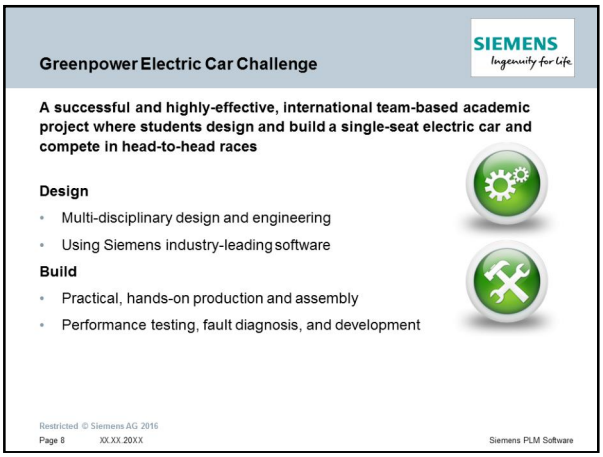
As a global engineering company Siemens reviewed many different project-based learning activities; searching to find one that addressed these limitations, covered the diverse and multi-disciplinary range of engineering, was industry-relevant, and had a proven track record within education.

In 2010 Siemens found the perfect project…



The Greenpower Electric Car Challenge is a successful, proven, and highly-effective project-based learning activity which requires students, working as a team, to design and build a single-seat electric car and then compete against other teams in head-to-head races. The project started in the UK in 1999 and is now running in 5 countries.

Design:


Greenpower Electric Car Challenge
SIEMENS
Ingenuity for life
A successful and highly-effective, international team-based academic project where students design and build a single-seat electric car and compete in head-to-head races
Design
Multi-disciplinary design and engineering
Using Siemens industry-leading software
Build
Practical, hands-on production and assembly
Performance testing, fault diagnosis, and development
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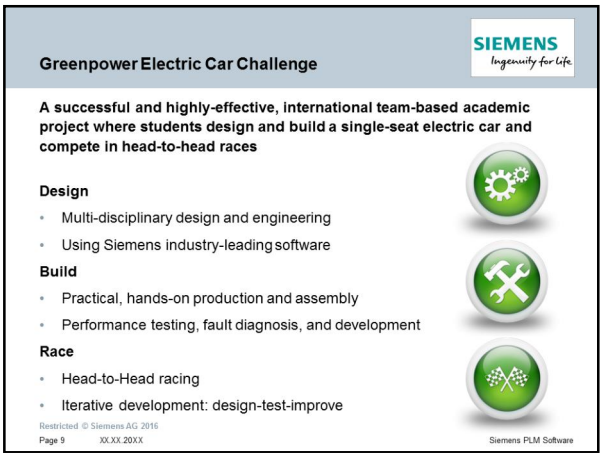
Siemens PLM Software

Build


Greenpower Electric Car Challenge
SIEMENS
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Design
Multi-disciplinary design and engineering
Using Siemens industry-leading software
Build
Practical, hands-on production and assembly
Performance testing, fault diagnosis, and development
Race
Head-to-Head racing
Iterative development: design-test-improve
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Page 9
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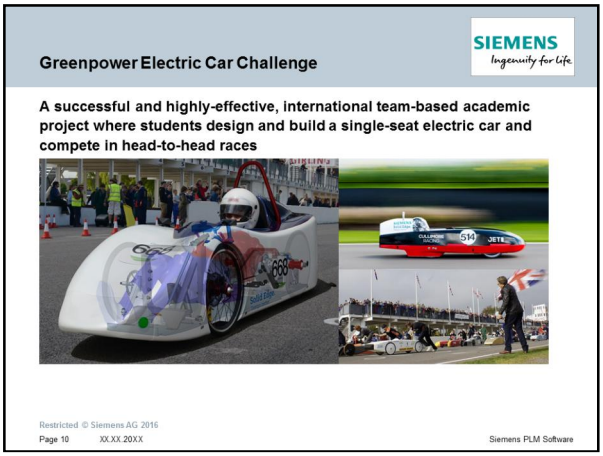
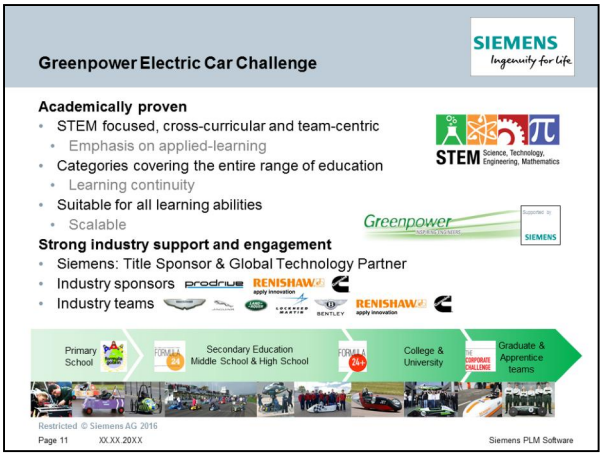
Siemens PLM Software

Race



There’s no narration for this slide. It’s just showing some pictures to help illustrate the Greenpower Challenge.



The Greenpower Challenge has been running since 1999 and delivers a proven STEM focused, truly cross-curricular and team-centric project with an emphasis on applied-learning.

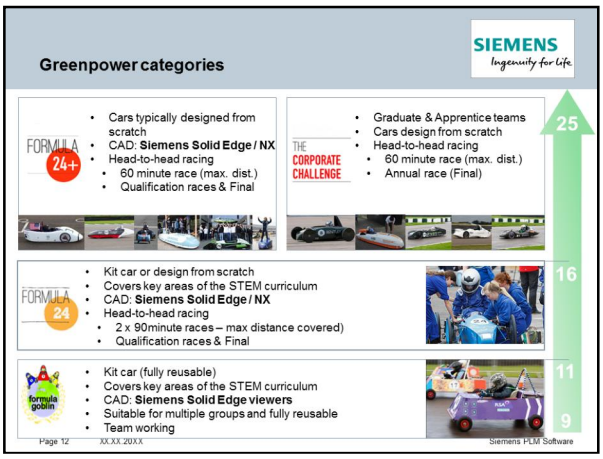
The Greenpower Challenge is unique in that it has categories covering the entire range of education from Primary School through to Graduate and Apprenticeship programmes. This approach provides learning continuity for students as they progress through their education.

The project is suitable for all learning abilities delivering an inclusive project students.

The Greenpower Challenge has strong industry support and engagement. Siemens are Title Sponsors and a Global Technology Partner.

Other leading companies support and sponsor Greenpower including prodrive, Renishaw, and Cummins.

There are also many industry teams from graduate and apprenticeship programmes, including teams from Jaguar-Land Rover, Lockheed Martin, Bentley Motors, Renishaw, Cummins, Perkins, and many more.



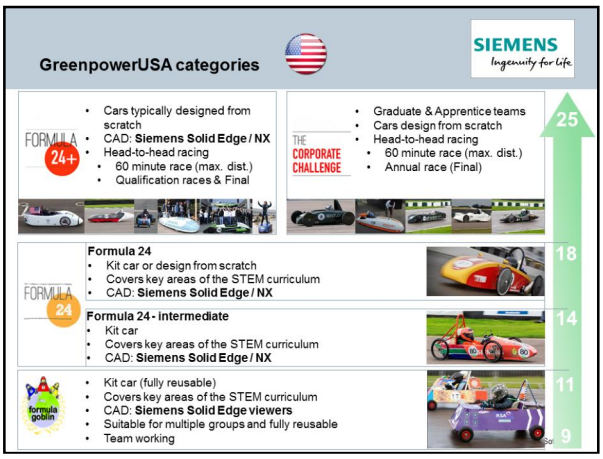
As mentioned the Greenpower Challenge has categories covering the entire range of education.

For students in Primary Education there's Formula Goblin. Students, working in a team, build a kit car. The project covers key areas of the STEM curriculum while also introducing students to engineering terminology and developing practical skills. The Goblin kit car is fully reusable. Siemens provides free software that enables student to explore a fully detailed CAD model of the Goblin kit car.

For students in secondary education aged between 12 and 16 there's Formula 24. Students, again working in a team, can either design and build a car from scratch or build the Formula 24 kit car. At this level the learning experience can be significantly enhanced with the use of industry-leading design and engineering software from Siemens, typically Siemens Solid Edge. Once their car is ready students can compete in organised Greenpower events where they can race head-to-head against other teams, testing the performance of both their car and their team. The Formula 24 event comprises of two 90 minute races requiring at least 3 drivers in each race with teams allowed a 3 step push to start their car on the Grid and exit from the pit-lane. Teams must compete in at least 3 regional heats and secure times good enough to qualify for a grid position at the International Finals.

For students in post-secondary education aged 16 to 25 compete in the Formula 24+ category. At this level many teams decide to design and build a car from scratch. At this level it is strongly recommended to use Siemens design and engineering software. Formula 24+ teams compete in a 60 minute race and there's no push start from the grid. The winning team is the one that can travel the furthest distance in the 60minutes requiring both speed and efficiency. Teams wish to secure a grid position at the International Finals must compete in qualification races over the season and secure a competitive result.

The Corporate Challenge category is open to graduate and apprenticeship programmes. All teams at this level design and build their cars from scratch. There's only one Corporate Challenge race which is held at the Greenpower International Finals. Some University teams also enter this category as they get the experience of racing head-to-head against teams from industry.



Note to the Presenter: this slide is only applicable to the USA.

As mentioned the Greenpower Challenge has categories covering the entire range of education.

For students in Elementary Education there's Formula Goblin. Students, working in a team, build a kit car. The project covers key areas of the STEM curriculum while also introducing students to engineering terminology and developing practical skills. The Goblin kit car is fully reusable. Siemens provides free software that enables student to explore a fully detailed CAD model of the Goblin kit car.

For students in Middle School aged between 12 and 14 there's Formula 24 intermediate. Students, again working in a team, typically build the Formula 24 kit car. Students are encouraged to use industry-leading design and engineering software from Siemens (typically Solid Edge) to design their car body.

For students in High School aged between 15 and 18 there's Formula 24. Students can still use the Formula 24 kit car or can design and build their own car from scratch. At this level the learning experience can be significantly enhanced with the use of industry-leading design and engineering software from Siemens, typically Siemens Solid Edge.

For both the F24 intermediate and F24 categories; once their car is ready students can compete in organised Greenpower events where they can race head-to-head against other teams, testing the performance of both their car and their team. The race events comprises of two 90 minute races requiring at least 3 drivers in each race with teams allowed a 3 step push to start their car on the Grid and exit from the pit-lane. Teams must compete in at least 3 regional heats and secure times good enough to qualify for a grid position at the National Finals.

Students in post-secondary education aged 18 to 25 compete in the Formula 24+ category. At this level many teams decide to design and build a car from scratch. At this level it is strongly recommended to use Siemens design and engineering software. Formula 24+ teams compete in a 60 minute race and there's no push start from the grid. The winning team is the one that can travel the furthest distance in the 60minutes requiring both speed and efficiency. Teams wish to secure a grid position at the National Finals must compete in qualification races over the season and secure a competitive result.

The Corporate Challenge category is open to graduate and apprenticeship programmes. All teams at

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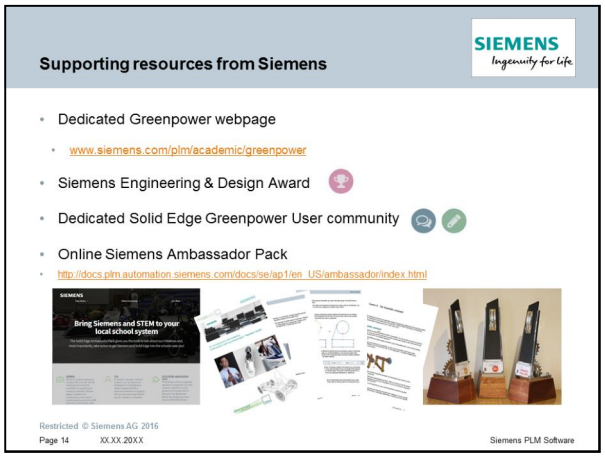
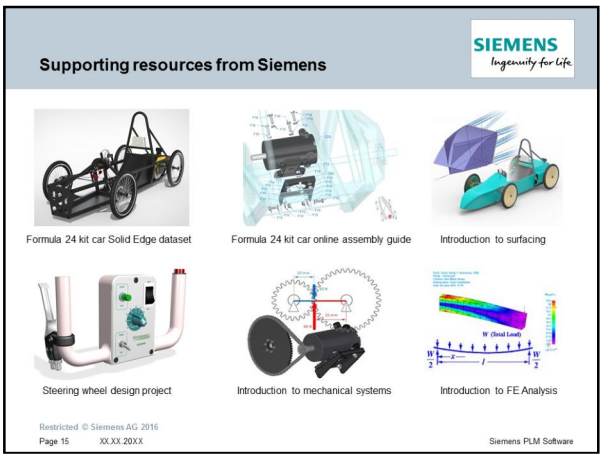


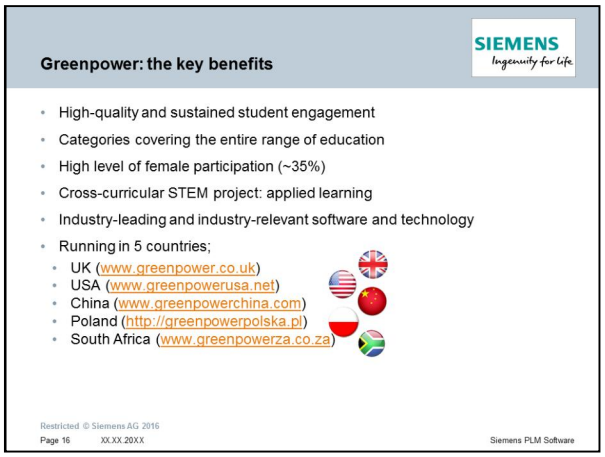
To help both educators and students, Siemens has a growing range of resources, developed by teachers for teachers located on a dedicated Greenpower webpage. These resources include project tutorials, both for Greenpower and other projects, video tutorials, and course-ware.

The Siemens Engineering & Design Award is open to all teams using Siemens PLM software. There's a specially designed trophy for each of the main categories; F24, F24+ and Corporate Challenge.

We also host a dedicated Greenpower forum and blog within the Solid Edge User Community and have created a Ambassador Pack to help Siemens staff, our Channel Partners and commercial customers proactively engage with academic institutions in their local community around STEM education.

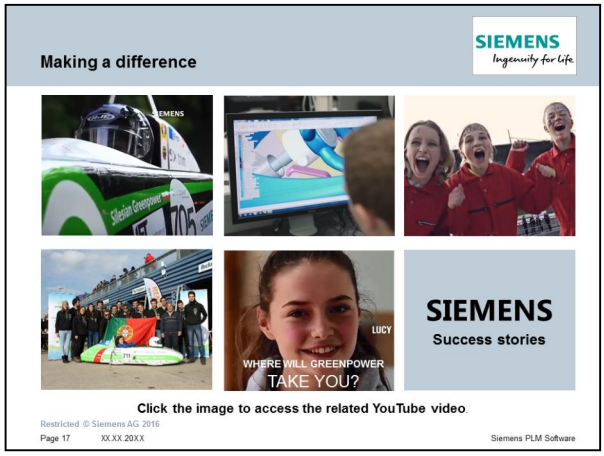


Our Greenpower focused resources also include a fully detailed Solid Edge dataset and a comprehensive online assembly guide for the Formula 24 kit car. There's also a growing range of project-tutorials "developed by teachers for teachers". These STEM focused project-tutorials cover both academic and Solid Edge related learning. Each project-tutorial includes teacher and student focused content.



The Greenpower Challenge provides academic institutions, graduate and apprenticeship programmes with a proven, high-quality cross-curriculum STEM project-based learning activity. For academic institutions there are categories covering the entire range of education which has a high level of female participation.

Participation exposes students to industry-leading and industry-relevant software and technology and the Greenpower Challenge is now running on 5 countries.



To help give you a more engaging and visual overview of the Greenpower Challenge and see the benefits this project brings to all those involved here are just a few examples.

Note to the Presenter:

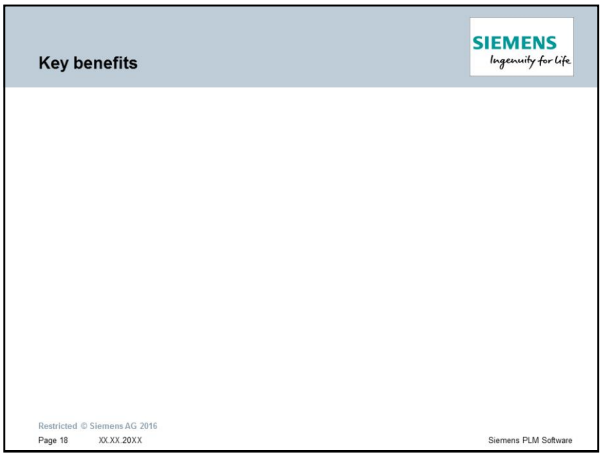
Top left: Video produced by Siemens PLM in Poland on the Silesian University of Technology. This university has been competing in the Greenpower Corporate Challenge for many years and currently has 3 Greenpower teams.

Top Centre: Siemens AG produced video following the US High School team (TeamUSA) and focusing on one student, Sean Webb. Sean is currently working as an intern at Siemens PLM Solid Edge R&D in Huntsville.

Top right: a video produced by the Greenpower Education Trust with footage taken at the 2016 Greenpower International Finals.

Bottom left: A Siemens Portugal video following the early days of the university team from the Instituto Superior Técnico in Lisbon, Portugal.

Bottom centre: a short video produced by the Greenpower Trust highlight a few success stories of students taking part in the Greenpower Challenge, both past and present, and how it's influenced them.

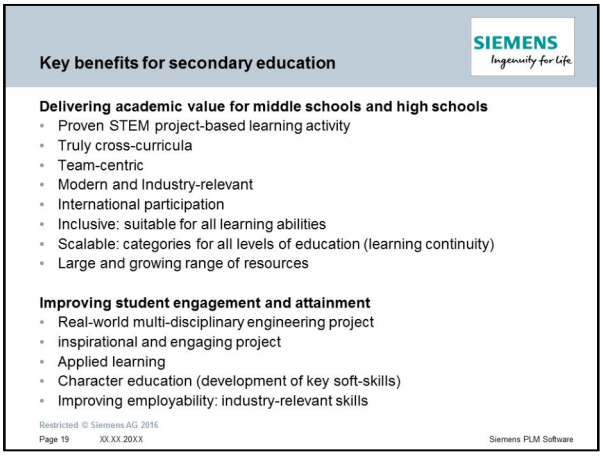


Note to the Presenter: The following slides provide a summary of the key benefits for different audiences;

Slide 19 - secondary education

Slide 20 – Post-secondary education

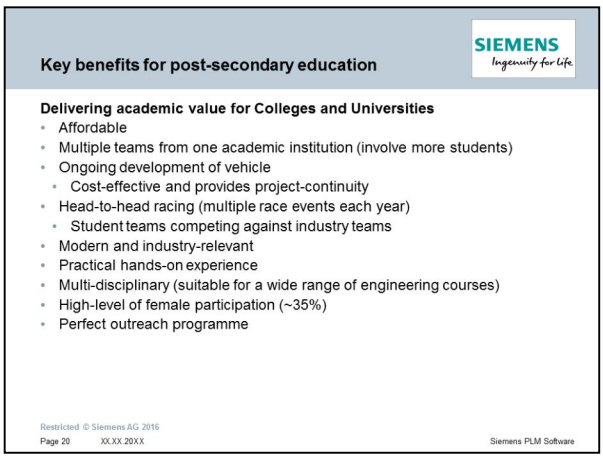
Slide 21 – industry



So to summarise:

The Greenpower electric car challenge delivers a proven STEM focused project-based learning activity that's team-centric, and truly cross-curricular. Greenpower enables students to participate in a modern and industry-relevant project that's both inclusive and scalable. For both educators and students there's also a growing range of high quality teaching and learning resources.

The Greenpower Challenge delivers an engaging and inspirational project that helps improve student attainment within a context of real-world multi-disciplinary engineering project. There's an emphasis on applied-learning and participation on the Greenpower Challenge helps develop industry-relevant and key soft-skills helping improve a students employability.



So to summarise;

For Colleges and Universities the Greenpower Challenge delivers a highly cost-effective project; the cost of building a Greenpower car is significantly lower than other automotive projects.

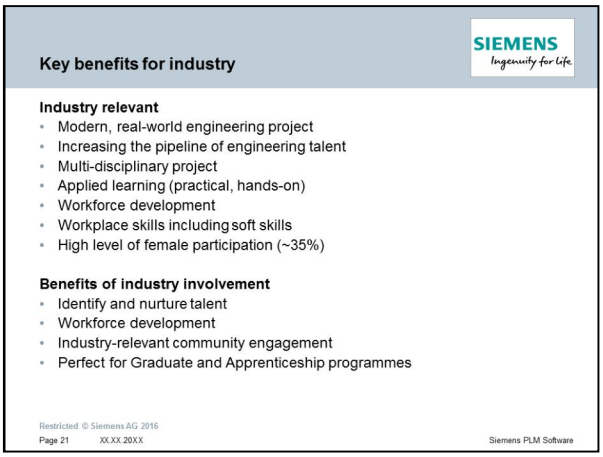
Greenpower also allows academic institutions to run multiple teams and thus increases the number of students able to participate. Students can also work on and develop the same vehicle over a number of years which again makes the project more cost-effective but also gives students project-continuity.

Participation in the Greenpower Challenge gives students increased opportunities to compete in head-to-head racing at multiple events throughout the year, enabling students to test their vehicle, and the team, in competition against academic teams and teams from industry. College and University teams from around the world can also compete in the Greenpower Corporate Challenge; a category that holds just one race every year at the Greenpower International Finals.

With automotive companies around the world increasing their focus on electric vehicles the Greenpower Challenge delivers a modern, industry-relevant project for students across the engineering disciplines, and also provides an excellent hands-on project enabling students to gain practical engineering experience.

The Greenpower Challenge also has a high-level of female participation not found in other engineering challenges.

As Greenpower has categories covering the entire range of education many Colleges and Universities also use Greenpower as an outreach activity with secondary education helping increase interest in engineering and the STEM subjects and, in some cases, providing an opportunity for their students to gain experience in mentoring teams from secondary schools.



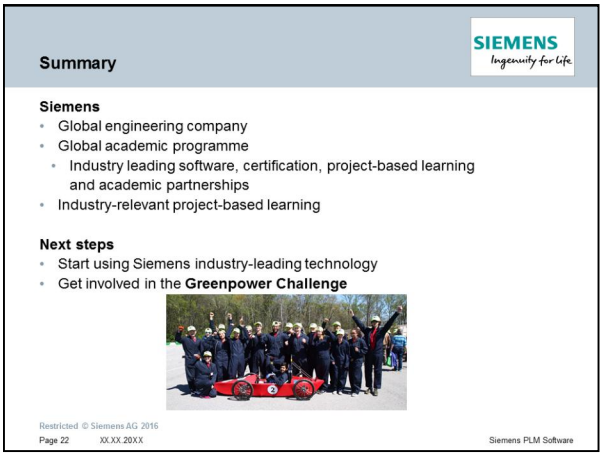
So to summarise:

The Greenpower Challenge provides students with a modern, industry-relevant, real-world engineering project that's actively helping engage students and develop a pipeline of engineering talent. Thanks to the multi-disciplinary nature of the Greenpower Challenge student get practical hands-on experience in a number of engineering disciplines helping develop both technical and soft-skills required by employers. We're also pleased to note that Greenpower has perhaps the highest level of female participation for an engineering challenge.

For companies actively involved in the Greenpower Challenge it enables them to identify and nurture talent, develop their future workforce and provides community engagement or a CSR activity that's relevant to their industry/business.

Greenpower is also perfect for companies with Graduate and/or Apprenticeship programmes and allows Graduates/Apprentices to develop as a team within the company.

Note to the Presenter: For an example of a Greenpower Graduate/Apprentice team you can show the following YouTube video (https://www.youtube.com/watch?v=8ZcaFZMF-_I). Renishaw is a global engineering company and their UK sites run 3 Greenpower teams. This short video was produced by Renishaw. Renishaw are a Siemens PLM customer and use NX.



And finally;

Siemens is a global engineering company with a global academic programme providing students and educators, at all levels of education, with industry-leading software, industry-recognised certification, industry-relevant project-based learning, and industry/academic partnerships. Siemens also supports the Greenpower Electric Car Challenge; an industry-relevant project-based learning avivity.

Siemens would like to encourage students, secondary schools, colleges, and universities to engage with Siemens and take advantage of our academic programme and industry-leading technology.

And we'd also strongly recommend all academic institutions, graduate programmes and apprenticeship schemes take part in the Greenpower Challenge.

Thank you

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