



*"The concept of the Smart Classroom is a blessing to the students of the 21st century living in rural regions throughout India. With the help of Trojan Battery, TeamSustain is able to establish clean sources of electricity to power this innovative learning system."*

*George Mathew, TeamSustain CEO*

## Smart Classroom

### Rural India

#### System specifications:

- **Batteries:** Trojan T105-RE\* 6-volt deep-cycle flooded batteries with Smart Carbon™
- **Solar Panel Modules:** Vikram Solar – 250Wp
- **Inverter:** Outback GXV3048E/GFX1448E
- **Charge Controller:** Outback FM60/FM80

There are several issues that hinder the growth of education in rural India. Lack of proper infrastructure at these schools is the major concern. Most of these locations do not have basic facilities such as clean water or reliable electricity. Equipment to educate local school children is also very limited and may consist of only a rudimentary blackboard and chalk. Textbooks, if any are available at all, are frequently outdated by the time they reach students.

To address this growing concern as to how to effectively educate children in all regions of India, TeamSustain joined with Trojan Battery Co. and American Tower Co. to introduce an innovative education concept called Smart Classroom.

The technology enhanced Smart Classroom fosters opportunities for teaching and learning by integrating a wide range of educational tools, such as computers, specialized software, audience response technology, assisted listening devices, networking and audio/visual capabilities.

Smart Classrooms use interactive modules including videos and electronic presentations that feature visually appealing methods of teaching. This concept encourages and inspires students to learn, who are otherwise struggling with traditional classroom teaching.

"The concept of Smart Classroom education is indeed a blessing to the students of the 21st Century. Technology is changing the way life functions, so children of all ages and socioeconomic backgrounds must have the right tools to be successful," said George Mathew, TeamSustain CEO.

Working in conjunction with American Tower and Trojan Battery, TeamSustain designed off-grid solar systems to provide electricity for these Smart Classrooms. To date, more than 200 Trojan Smart Carbon batteries have been installed among the 18 Smart Classrooms, which are located in remote villages of India in the states of Assam, Bihar, Karnataka, Orissa, Telangana and West Bengal.

With no access to electricity, the Internet, or clean drinking water, the challenge for TeamSustain was to understand and analyze the scenario, and provide a complete solution to improve the education and living conditions of the local children.



# Smart Classroom

## Rural India



As a Corporate Social Responsibility (CSR) initiative by American Tower, a team of engineers from TeamSustain conducted site surveys at selected schools and prepared site visit reports detailing the existing condition of the schools.

The engineers from TeamSustain then developed a list of technology requirements needed to modernize these schools and bring them to the same level as other schools in the region.

These technology and equipment suggestions consisted of equipping Smart Classrooms with LED lights, TVs, computers, as well as solar-powered water purification systems to provide clean water.

TeamSustain then designed off-grid solar systems to provide the necessary clean and reliable electrical energy needed to power these educational institutions.

Trojan Smart Carbon™ deep-cycle batteries were selected as the battery-backup solution for the Smart Classroom project based on their reputation for high quality and reliability. Trojan Battery's Smart Carbon Premium line of deep-cycle, flooded batteries are specifically engineered to withstand the rigorous conditions of renewable energy applications such as extreme temperatures, remote locations and the intermittent nature of solar power generation.

Smart Carbon is Trojan's proprietary carbon formula featured in its Premium line of batteries and offers improved performance when the batteries operate in a partial state of charge (PSOC). PSOC occurs when batteries are not fully charged or discharged each day, which can impact the life of the battery. PSOC is a common occurrence in renewable energy applications due to the varying levels of irradiance, temperature, and available sun hours.

### HiWEL – Taking the Classroom to the Playground

Another concept to expand learning is Hole-in-the-Wall (HiWEL), an idea which offers a fresh unique perspective on the learning process. Breaking the traditional confines of the classroom, HiWEL places interactive learning stations on the playground. It employs a unique collaborative teaching approach, and encourages children to explore and learn.

For schools in rural areas, HiWEL enables children to congregate on the playground to participate in computer-based interactive learning game. This allows them to broaden their horizons, while at the same time interact among themselves, fostering communication skills.

"For children, HiWEL is an extension of their playground where they can have fun together, teach each other new things and more importantly, just be themselves," Mathew said.

\*The T105-RE battery has transitioned to the Solar Premium SPRE 06 255 battery.

### For more information contact:

**Trojan Battery Company**  
[www.trojanbattery.com](http://www.trojanbattery.com)

**TeamSustain Ltd.**  
[www.teamsustain.com](http://www.teamsustain.com)

**American Tower Company**  
[www.americantower.com](http://www.americantower.com)



Trojan batteries are available worldwide through Trojan's Master Distributor Network. We offer outstanding technical support, provided by full-time application engineers.

**For a Trojan Master Distributor near you, test call 800.423.6569 or + 1.562.236.3000 or visit [www.trojanbattery.com](http://www.trojanbattery.com)**

12380 Clark Street, Santa Fe Springs, CA 90670 • USA