



# ANNUAL REPORT 2011

Empower Playgrounds, Inc.



DO NOT Rub

Mouth	broom	Sweat
Month	Wife	Wine
Mouse	tooth	cream
Water	tooth	brush
Write	group	break
Fish	front	stare
Class	found	build
Right	shoe	board
Use	plate	learn
Ward	ball	probe
Ward	ball	probe
Ward	ball	probe
Ward	ball	probe

1. Find the area of a rectangle whose length is 5cm and breadth is 3cm.

2. A rectangle has its area as 35cm<sup>2</sup>. If the breadth is 5cm, find the length.

3. Find the breadth of a rectangle that has an area of 36cm<sup>2</sup> and length of 10cm.

4. If a rectangle has 4cm as its length and 2cm as the breadth, find the area of the rectangle.

account of a prodigal son

25<sup>th</sup> February

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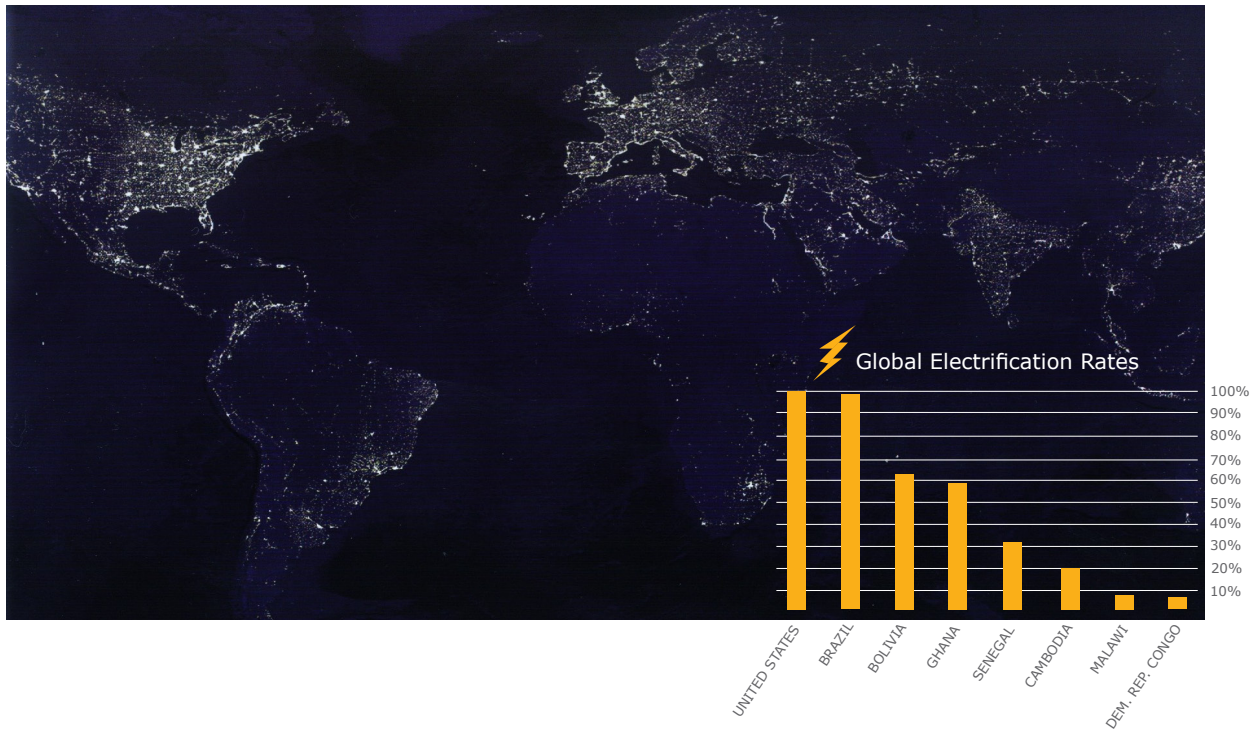


## MISSION

Empower Playgrounds, Inc. (EPI) enhances educational opportunities for children in deprived villages by providing renewable energy through electricity-generating playground equipment, smart LED lanterns, and hands-on science kits.

EPI is a US based 501(c)3 public charity that has developed electricity-generating playground equipment for use in rural third-world communities and orphanages. Donor-provided funding allows EPI to reach children in subsistence-farming communities, all of whom attend poorly equipped and underfunded schools. After classes, most children in these villages work on family farms or have other chores until dark, thus limiting their time to read or do homework while there is still light. In essence, these children lack opportunity for study and play in their lives. EPI seeks to remedy this.

## QUICK FACTS



### EMPOWER PLAYGROUNDS 2011 STATS

Year of established 501(c)3 status	2007
Total # electricity-generating playgrounds installed (2007-2011)	30
Expected installations for 2012	10
Estimated number of children reached (2007-2011)	5,000
Cost of a lantern	\$50
Cost of a science kit	\$200
Total cost of total installation (playgrounds, lanterns, science kits, school selection, shipping and labor)	\$10,000
Number of employees (North America)	2
Number of employees (Ghana)	1
Number of interns (2011)	4

## WHY EPI?

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In our age of vast technological advancement, it is strange to think that there are still communities without electricity. Yet over half of all citizens in rural developing communities are without access to this seemingly pervasive commodity. In fact, in the most dire situations, national electrification rates can hardly reach 7%; and according to the World Bank, only one in four Africans has access to electricity from a grid. This dearth, which is often felt most poignantly by those in rural areas, has the effect of hindering social advancement. Though not entirely to blame, this lack of electricity relates closely to the under achievement of education in developing countries. For example, one notes the detrimental effects that this lack has on children in the classroom. Without light at home or in their schools, children of rural communities find it difficult to read or do homework at night. Because they assist on farms and at other chores until past sundown, there is often no natural light remaining when it comes time to study. If alternative light is available, it's usually via kerosene or disposable battery lanterns—both of which are expensive for families struggling to survive.

As an added detriment to the lack of electricity in rural villages, school teachers are often reluctant to stay in such communities because they are accustomed to the accoutrements of urban life—where electricity is at least somewhat more reliable. In all, it is quite apparent that the lack of electricity severely affects the education of young children in rural developing communities. This is what EPI seeks to remedy!

## HISTORY

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After retiring as Vice-President of Engineering, ExxonMobil Research and Engineering, Ben Markham and his wife moved to Ghana, Africa for eighteen months as volunteer service missionaries. There, Ben observed the darkness of rural homes and school classrooms. He also saw the scarcity of play equipment in schoolyards. Touched by their happy smiles, Ben thought, “What if a portion of the playful energy from these children could be harnessed? What if that energy could become light for their classrooms and homes?”

With help from faculty and students at Brigham Young University, engineering expertise and social know-how was applied to create an innovative and viable solution: playground equipment that generates electricity from children's play! The concept was field tested and improved in Ghana. Kweku Anno, of Anno Engineering in Accra, converted the design to utilize materials readily available in Ghana. After a rigorous process of school selection involving EPI social scientists and the ministry of Education, Anno Engineering manufactured the systems and installed them in the selected schools. As a result, these schools not only benefit from EPI's electricity-generating play equipment, but also from a custom science education module, which helps to enhance the direct learning of rural students by using the play equipment as a living lab.

### **Thus was born Empower Playgrounds, Inc.**

Initially, EPI hand modified LED camping lanterns so they could be recharged by the EPI system. In 2009, Energizer Battery, Inc. became a sponsor for EPI, donating development of a smart LED lantern specifically designed for the EPI service. The smart lantern has a computer chip inside that manages both the charging of the custom battery pack and the operation of the special LED lights. Lighting equivalent to a 25 watt light bulb for over 40 hours is provided by each recharge. Lantern life is expected to be around 5 years.

## PARTNERS

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The work-horse on the EPI playground is a platform merry-go-round, or "Whirl," that allows many children to ride while a few take turns pushing. This Whirl is manufactured by Playworld Systems Inc., a world-wide leader of customized playground equipment out of Lewisburg, Pennsylvania. The generation train starts with the kinetic energy of children at play, which turns a hub bearing to which the entire deck of the Whirl is attached. A drive shaft from the hub connects to a helical gearbox operating as a speed-increaser. The high-speed output shaft then turns a permanent rare earth magnet windmill generator. The efficiency of this generator is over 70%.



Once the electricity is generated, it is sent via underground wires to a power enclosure, designed by the renewable energy solutions company Goal Zero, where it is converted to direct current and used to charge a large storage battery. In the enclosure, a state of the art MPPT (maximum power point tracking) power controller effectively manages the charging and discharging of the storage battery, ensuring long battery life. A solar panel is also connected to the power enclosure for educational purposes and to prevent battery discharging during school breaks. The CIGS (Copper Indium Gallium Selenide) solar panel provides about one third of the total system energy when school is in session.



The large storage battery is used to charge the lanterns that students are able to take home at night for study groups. The custom LED smart lantern designed by Energizer Battery, Inc. exclusively for EPI has a nickel-metal hydride (NiMH) battery pack capable of providing over 40 hours of bright light between recharges. A computer chip in each lantern manages recharging from the large storage battery, as well as power to the LED bulbs. The lantern service life is expected to be greater than five years.

### *Loose in the Lab*

Most often, the schools in which EPI functions are comprised of nothing more than cement buildings, chalkboards, and wooden desks. Because they lack school supplies, and because they are rarely in contact with such amenities as electrical and mechanical devices, the students of these schools often have difficulty grasping the theoretical concepts of science. The electricity-generating playground equipment of EPI is the perfect science lab for the principles of general physics, energy transfer and many other scientific topics! What's more, EPI has teamed with Loose in the Lab to supply EPI-sponsored schools with a full science module, complete with science lab equipment. The EPI lab includes such supplies as: thermometers, measuring tapes, solar cookers, magnets, compasses, solar cells, and wires. Most of the children in EPI schools have never seen items such as these.

## STAFF PROFILES

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Ben Markham - President, Ben is a retired ExxonMobil Executive who chose an encore career in a very different portion of the energy sector.



Chris Owen - Executive Director and Photographer, Chris is an entrepreneur and Master's of Public Administration student at Brigham Young University who finds satisfying challenges helping EPI fulfill its objectives. Chris has worked in Ghana and has a creative side that helps to envision the future for EPI.



Isaac Darko-Mensah - Country Director (Ghana), Isaac is EPI's hands-on management for growth in Ghana. Young and energetic, Isaac is the primary employee for EPI's Ghanaian branch.



Taylor Brown - Director of Media and Webmaster, Taylor has a Master's of Science in evidence-based social intervention from the University of Oxford and a confidence and passion focused to improve the world through many avenues. Taylor began her work with EPI as a social science intern in Ghana.



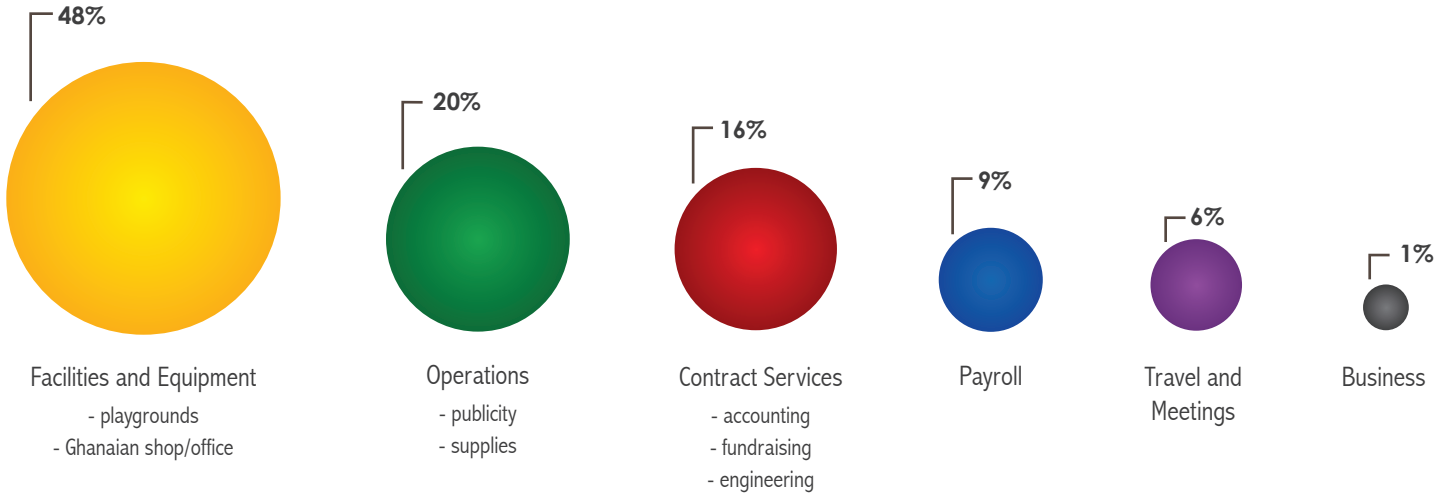
Kweku Anno - Engineering Specialist (Africa), Mechanical engineer and entrepreneur, Kweku is dedicated to lifting his fellow Ghanaian countrymen. Kweku helped to design and manufacture the very first electricity-generating playground equipment in Ghana, at his shop in Accra.



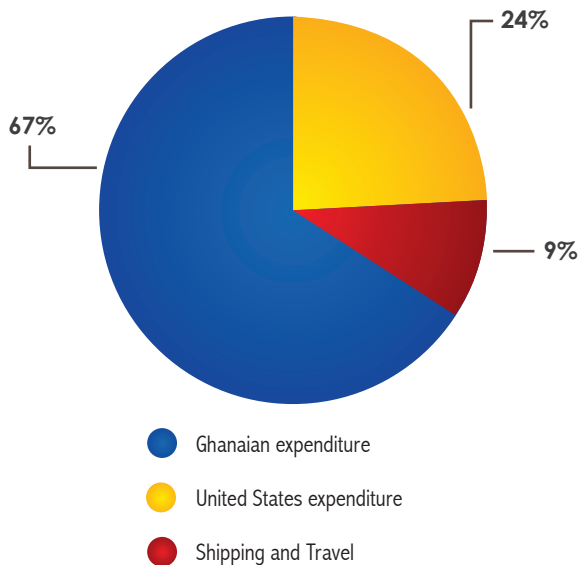
Alan Riser - Engineering and Manufacturing Specialist, Alan applies his expertise to the need in African villages that he loves.

Empower Playgrounds Inc. is funded 100% by charitable donations. The following charts indicate the breakdown of expenditures for the full year of 2011.

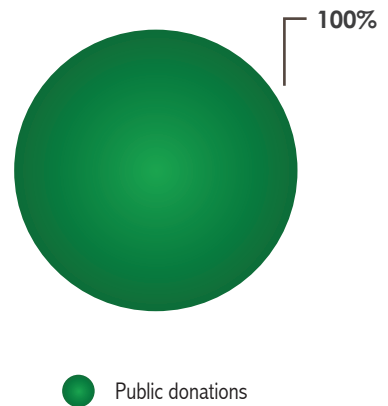
**Empower Playgrounds Expenditure,  
Sectoral Breakdown 2011**



**Empower Playgrounds Expenditure,  
National Breakdown 2011**



**Empower Playgrounds Income,  
Sectoral Breakdown 2011**



# empower playgrounds inc.

- 2012** 10 new PSI systems installed in Ghana

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- Loose in the Labs begins providing EPI science kits

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- 2011** First installation of PSI Whirl in Ghana

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- Playwold Systmes Inc. partners to begin manufacturing "Whirl" to send worldwide

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- Shipment of 1000 custom Energizer Battery lanterns arrive in Ghana

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- 2010** Energizer Battery signs sponsorship agreement with EPI

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- Glider swing pilot installed in Ghana

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- Playgrounds installed in 20 villages

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- EPI documentary 'A Turn for Ghana'

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- 2009** Playgrounds installed in 5 prototype villages

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- First playground is installed in rural Ghana

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- 2008** Anno Engineering in Ghana agrees to manufacture EPI playgrounds

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- EPI achieves 501(c)3 non-profit status

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- 2007** Playground prototype built by Brigham Young University engineering students

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- 2006**

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- 2005** Ben and Julie Markham spend 18 months as service missionaries in Ghana

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- 2004** Ben conceives of the EPI playground concept

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- 2003** Ben Markham retires as VP of Exxon Mobile

## 2007

Established as a 501(c)3 public charity

play. light. learn.



- 3** Employees
- 4** Interns
- 4** Partners

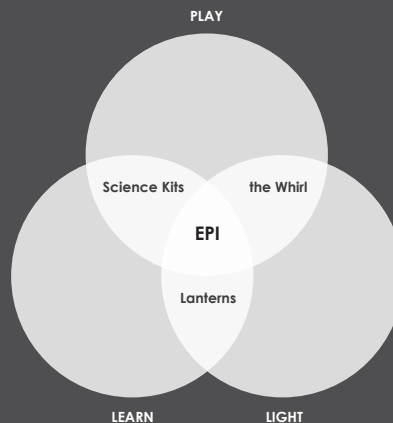
**GHANA** (rural)\*

**Population:** 11.6 million

**Population without electricity:** 9.4 million

**Children persisting to last grade of primary school:** 73%

**Secondary School Enrollment (gross):** 56%



**30**   
Playgrounds installed as of January 2012

**10**   
Playground installations planned for 2012

Children reached as of January 2012

## 5000+



\*<http://www.tradingeconomics.com/ghana/indicators>



### PLAYWORLD SYSTEMS AND EMPOWER PLAYGROUNDS PARTNER TO BRING PLAY AND LIGHT TO CHILDREN IN GHANA

#### Electricity-Generating Playground Equipment Illuminates Villages, Helps Students Overcome Education Barrier

LEWISBURG, PA (November 8, 2010) – Playworld Systems, a leading manufacturer of imaginative playground equipment, today announced an exclusive partnership with Empower Playgrounds, Inc., a non-profit organization that provides renewable energy to villages in Ghana through electricity-generating playground equipment and smart LED lanterns. By lending its research and development resources, materials and facilities, Playworld Systems is helping Empower Playgrounds further its mission by accelerating production of the play equipment – merry-go-rounds known as “whirls” – that generate power while the kids play during the day for portable lanterns that light evening activities at home.

Ben Markham, a retired ExxonMobil engineer from Utah, founded Empower Playgrounds in 2007 after spending time in Ghana as a missionary. He observed that the schoolchildren lacked two important things: play equipment and light. The latter presents a major barrier to their education, as most children in Ghana work on family farms immediately after school and have no light for schoolwork or reading once the sun goes down.

“Ben’s mission to help the children of Ghana through the combination of play and light is deeply inspiring,” said Matt Miller, CEO of Playworld Systems. “We believe play and education are both vital to the human experience, regardless of geography, age or ability. We’re ecstatic to work with Empower Playgrounds to help enrich the lives of others in such a profound and innovative way.”

Approximately 3,000 children have access to the whirls, which have been installed by Empower Playgrounds in the most remote and deprived villages. This week, Markham and Miller are in Ghana to install two prototypes of the new whirls manufactured by Playworld Systems. By 2012, they plan to make the power-generating systems available to developing nations across the globe.

“Enabling students to study and read at night is a life-changing development for families living in isolated areas of Ghana,” said Markham. “Working with Playworld Systems to develop and install new whirls allows Empower to bring light to more villages in Ghana and beyond at a much faster rate than we would have been able to on our own.”

Empower Playgrounds provides the whirls and lanterns at no cost to rural villages. Once the equipment is installed, power is produced as the kids play. The lanterns are a specially modified camping lantern developed for Empower Playgrounds by Energizer Battery, Inc. These rechargeable lanterns can operate 40 hours at full power before needing to be recharged. The Empower Playgrounds system also includes a hands-on science kit that enables local educators to also use the whirls as learning opportunities for their students.

About Playworld Systems, Inc. Playworld Systems, a third-generation family-owned company headquartered in Lewisburg, Pa., has been a leader in imaginatively designed and customized commercial recreation and playground equipment for more than 30 years. With the belief that The World Needs Play®, Playworld Systems creates equipment that brings the joy of play to people of every age through such innovative product lines as ENERGI®, LifeTrail® Advanced, Playworld™ PlayDesigns®, and NatureForms™. Playworld Systems has invested significant resources to measurably reduce its carbon footprint, from eliminating PVCs to enhancing its waste management and recycling programs. In fact, Playworld Systems is the first major U.S. playground manufacturer to remove 99.999 percent of PVC from its products.

The company has received numerous awards throughout the years, including two International Industrial Design Excellence Awards, a gold medal from International Design magazine, two News Directors’ Choice Awards on Early Childhood, and the Pennsylvania Governors’ Award for Safety Excellence. Along with these awards, Playworld Systems was a consultant to the Architectural and Transportation Barriers Compliance Board (Access Board). For more information, visit: [HYPERLINK “http://www.PlayworldSystems.com”www.PlayworldSystems.com](http://www.PlayworldSystems.com).

About Empower Playgrounds, Inc.

Empower Playgrounds, Inc. is a non-profit organization that enhances education in rural Ghanaian schools by providing electricity-generating playground equipment, portable LED lanterns, and hands-on science kits and curriculum. For more information, visit: [www.empowerplaygrounds.org](http://www.empowerplaygrounds.org).

### ENERGIZER AND EMPOWER PLAYGROUNDS LIGHT AFRICA TOGETHER New Lantern Developed for use with Electricity-Generating Playgrounds

Energizer Battery, Inc. recently donated the development of an LED lantern designed specifically for Empower Playgrounds, Inc. (EPI), a Provo, Utah, based nonprofit company. The first shipment of 1,000 lanterns arrived in Ghana, West Africa, during February 2010.

“It is not a problem to get children who have never seen playground equipment to push a merry-go-round. The challenge is to deliver a small portion of their energy as usable, portable light. Energizer has donated its world class engineering and manufacturing expertise to deliver an elegant lighting solution for these children. Educational opportunities will reach a new level in these villages.” said EPI founder, Ben Markham.

The new design features rechargeable battery packs plus custom charging and power management circuitry, all inside the lantern. Benefits of the new lanterns include improved lighting, easy recharging, longer battery life, and lower total system cost.

Empower Playgrounds has developed electricity-generating playground equipment, such as merry-go-rounds and swing sets. The donated equipment is installed at rural Ghanaian schools. As the children play, they turn an electrical generator. An underground cable transmits the power to a safe enclosure where it is stored in a large battery. The Energizer® LED lanterns are recharged about once a week from the storage battery.

These villages are off the electric grid. Ghana is situated on the equator where the sun always sets around 6 p.m. The lanterns allow children to study together in small groups at home during the evening hours.

Empower Playgrounds was founded in 2007. Since conception, the company has impacted more than 1,500 students in rural Ghana by providing educational recreation, light for evening studies, and hands-on science labs. To learn more about Empower Playgrounds, please visit [www.empowerplaygrounds.org](http://www.empowerplaygrounds.org).

#### About Energizer

Energizer Holdings, Inc. [NYSE: ENR], headquartered in St. Louis, MO, is one of the world’s largest manufacturers of primary batteries, portable battery-powered devices, and portable flashlights and lanterns. Energizer is a global leader in the dynamic business of providing power solutions with a full portfolio of products including Energizer® brand battery products Energizer® MAX® premium alkaline; Energizer® Ultimate Lithium; Energizer® Advanced Lithium; Rechargeable batteries and charging systems; and portable flashlights and lanterns.

Energizer continues to fulfill its role as a technology innovator by redefining portable power solutions to meet people’s active lifestyle needs for today and tomorrow with Energizer® Energi To Go® chargers for rechargeable portable devices; charging systems for wireless video game controllers; and specialty batteries for hearing aids, health and fitness devices, as well as for keyless remote entry systems, toys and watches. Energizer is redefining where energy, technology and freedom meet to bring to market consumer-focused products that power the essential devices that help people stay connected and on the go at work and at play. Visit [www.energizer.com](http://www.energizer.com), [www.facebook.com/energizerbunny](http://www.facebook.com/energizerbunny).

## IMPORTANT LINKS AND CONTACTS

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- Videos:** YouTube channel PlayLightLearn (<http://www.youtube.com/user/PlayLightLearn?feature=mhee>)
- Recent News:** Radio Netherlands Worldwide, interview with President Ben Markham and Ghanaian teacher Ebenezer Titume - 01/27/10  
Daily Herald, "Provo's Empower Playgrounds joins Playworld Systems in Africa" by Matt Reichman - 11/13/10  
Playworld Systems Blog enteries from Ghana, <http://www.playbyplayworld.com/?tag=empower-playgrounds> - 11/12/10
- President:** Ben Markham, [ben@empowerplaygrounds.org](mailto:ben@empowerplaygrounds.org)
- Executive Director:** Chris Owen, [chris@empowerplaygrounds.org](mailto:chris@empowerplaygrounds.org)
- General Inforamtion:** [info@empowerplaygrounds.org](mailto:info@empowerplaygrounds.org)
- Donations:** [donations@empowerplagrounds.org](mailto:donations@empowerplagrounds.org)
- Website Information:** Taylor Brown, [webmaster@empowerplaygrounds.org](mailto:webmaster@empowerplaygrounds.org)
- Blog:** <http://playlightlearn.wordpress.com/>

### STORIES FROM GHANA

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"After supper, it was dark and all of the school aged children moved a four wheeled cart with a flat top on it, like a table, out in front of the house. It gets dark here at about 6pm all year, and they stay up until about 10pm, so they ... got one of the merry-go-round lanterns and began to do their homework. As all the men were sitting off by themselves talking as men usually do in Africa, I looked over at the twelve children huddled around the small makeshift table doing their homework by the light."

- Alan Riser, EPI Engineer

"It was so awesome to be in Ghana to see the whole merry-go-round project unfold - right before our very eyes, it seemed. I was so impressed and AMAZED to see how smoothly the whole thing came together. To be busy talking, working, and playing with the children - and then before we knew it, we were hearing the sounds of "Merry-go-ROUND!, merry-go-ROUND!" as they played on the merry-go-round. The same day it was started! To look out of the classroom and see that merry-go-round CROWDED with children who were laughing, and screaming with delight, was one of the most incredible moments of my trip to Ghana."

- Janet VanderStappen, Operation Love in Action

"I travelled many times with EPI to a school that was settled in a vast flatland where mango trees landscaped the schoolyard. The children walked for miles each day to reach school, but whenever we unexpectedly arrived, they were in class and as attentive and playful as my students back home in America. Once, when the merry-go-round needed a bit of maintenance, a young woman, about 12-years-old, approached me with concern and asked, "My sista, we would like to know... when will the merry-go-round be back so that we can have light again?" It was touching and impressive to see the worth of the LED lanterns to these students."

- Taylor, EPI Social Science Intern, 2009



# PHOTOGRAPHS





