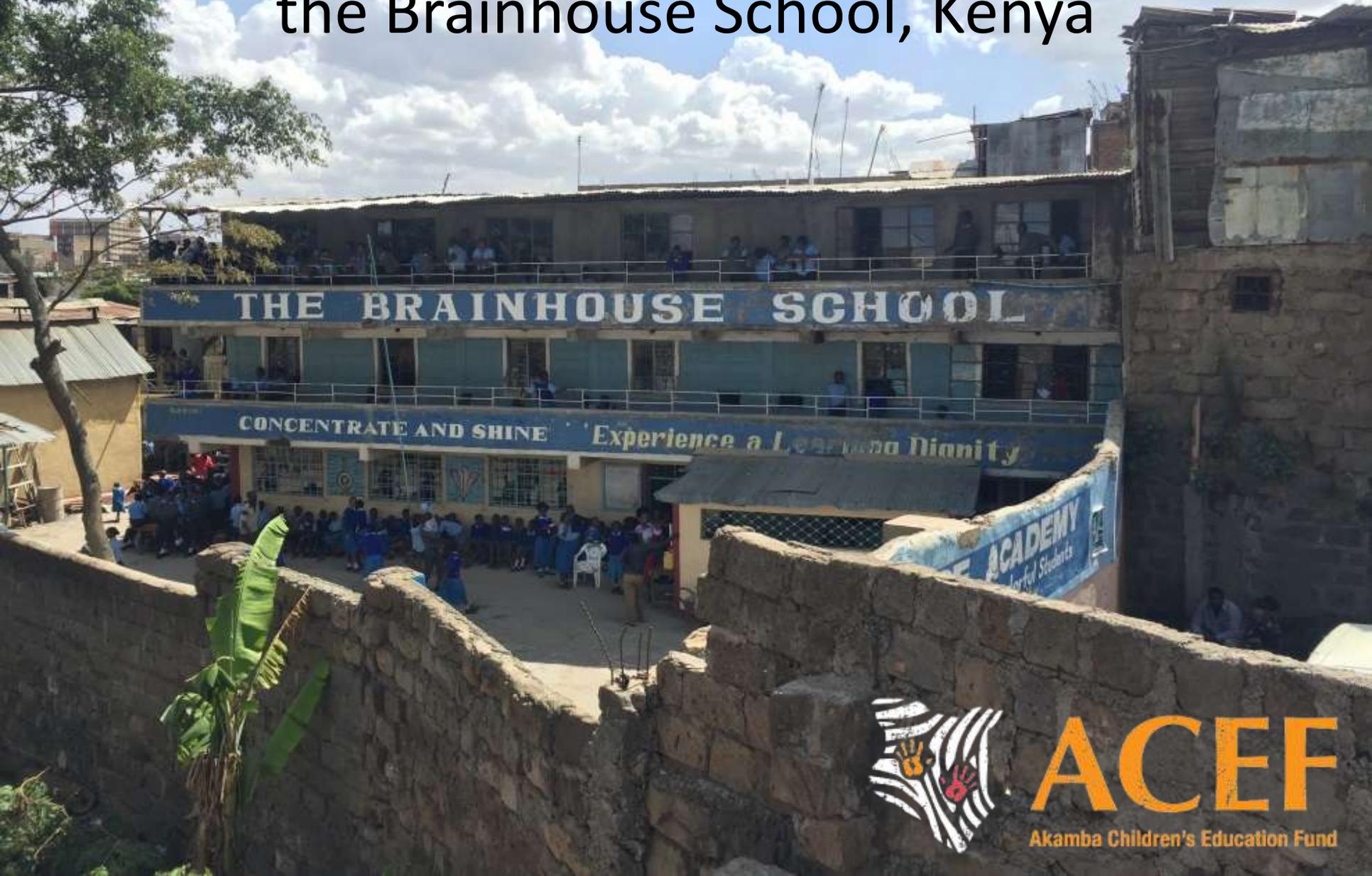


ACEF Green Toilets Project at the Brainhouse School, Kenya



ACEF

Akamba Children's Education Fund

The Challenge

Brainhouse School is located in one of the world's largest slums in Kenya, and is home to over 800 students.

Unfortunately, the existing toilet facilities are in poor condition and there are too few of them.

There are no lights or hand washing facilities, and the untreated waste is discharged directly into the nearby river.

As well as being bad for the environment, the current situation poses a serious health risk to all of the children at the school.

ACEF supports Brainhouse by providing money for food, clothes and educational materials, and is now working to address this issue also.

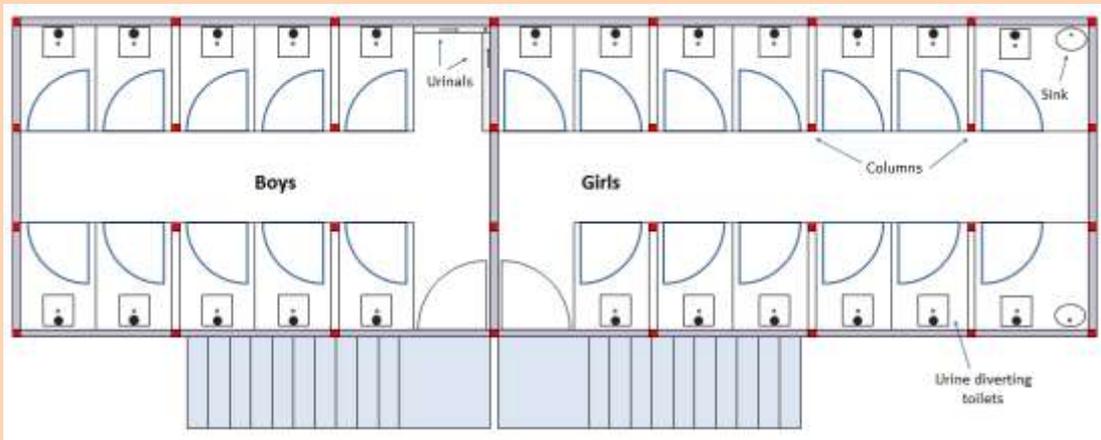


The Solution

ACEF is planning to install a new toilet block at Brainhouse School, complete with 23 new and innovative 'green' toilets.

As well as providing new, clean toilets with lighting and hand washing facilities, the new Green Toilets will employ anaerobic digesters to treat the toilet waste and convert it into two valuable products:

1. **Biogas** - a flammable gas which could be used for cooking, heating and lighting the school.
2. **Liquid fertiliser** – a nutrient rich solution which could be sold to local farmers to raise additional funds for the school.

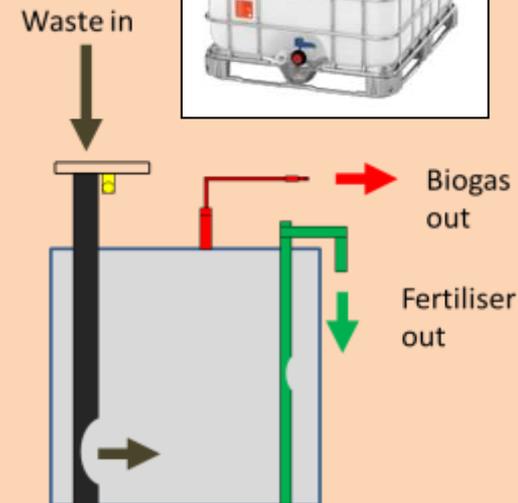


Benefits

- This Project will deliver multiple benefits:
 - **Improved sanitation** – reduces the risk of children catching deadly diseases.
 - **Wastewater treatment** – protects the local rivers and drinking supplies.
 - **Replacing wood and charcoal with biogas** – saves the school a substantial amount of money, protects the kitchen staff from deadly respiratory diseases, reduces the number of trees being chopped down, and reduces CO2 emissions to help combat climate change.
 - **Supporting the local community** – purchasing materials and employing local tradesman provides much needed income to the local community.
 - **Practical skills training** – providing the older children with skills improves their chances of gaining employment in the future.
 - **Additional income** – sales of surplus biogas and fertiliser generates additional income and makes the school more financially independent.
 - **Widespread adoption of sustainable technology** - Overcoming cultural barriers and demonstrating the potential for adopting biogas and renewable energy technologies across the whole of Africa.

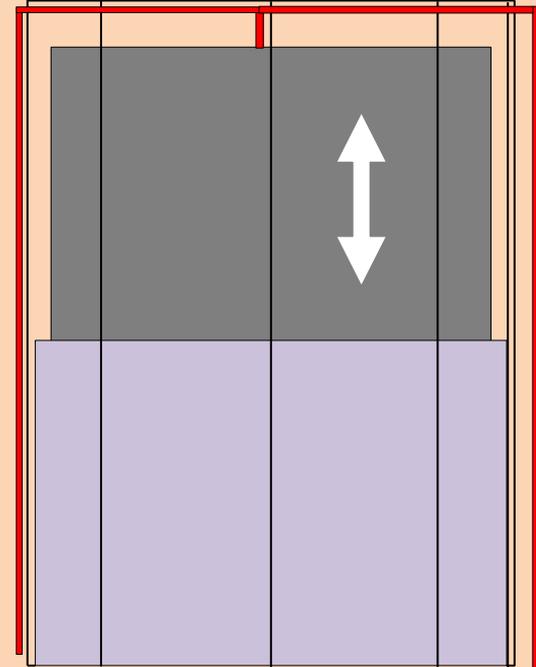
How it works

- Urine diverting toilets (squat toilets in this case) separate the solid and liquid waste.
- The solid waste falls into 1 of 23 bio-digesters (made from repurposed IBC water tanks) located directly beneath each toilet cubicle so no flush is required, saving water.
- The waste will be in the digester for around 50 days, being broken down by anaerobic bacteria to produce biogas (a mix of methane and CO₂) and a nutrient-rich fertiliser. New waste entering the digester pushes the fertiliser out, meaning that the system operates continuously without manual intervention or pumps.
- The fertiliser is captured for use by local farmers, or treated in a reed bed wastewater treatment system.
- Biogas is produced 24 hours a day for use in the kitchen.
- The urine is converted into electricity to power LED lights in the toilets using Pee Power technology, which is being trialled at Brainhouse by a team from Bristol University.



How it works

- The biogas will be stored in 'floating' biogas tanks made from readily available water tanks.
- The bottom tank is filled with water, and the top tank rises as it fills with biogas.
- The weight of the top tank alone provides the pressure to push the biogas to the cooking stoves in the kitchen.
- The floating gas tank design prevents gas pressure from building up by expelling gas out of the bottom when full. Biogas is also incredibly safe. No risk of explosions.
- Cooking can be done on specially designed biogas stoves, modified gas stoves, or even a repurposed coffee tin.
- It is expected that the gas will provide several hours of cooking time each day.
- Surplus biogas can be captured into portable gas bags and sold to the local community to use in their own homes.



Success Criteria

The following success criteria have been established for the project:

- ✓ Installed on time, to budget, and without any safety incidents.
- ✓ The school accepts the completed system. Maintenance teams within the school are assigned, trained and assessed as competent.
- ✓ Sufficient quantities of biogas are produced to cater for all of the school's cooking requirements. No additional wood or charcoal is required.
- ✓ 100% of the waste is either collected for use as a fertiliser, or treated in the reed bed waste treatment system. No longer discharging untreated waste to the river.
- ✓ Successful operation and gas production over 12 months following installation. Any performance issues are immediately rectified and reported.
- ✓ The Project inspires the commencement of at least one further biogas project within Kenya within the following 2 years.

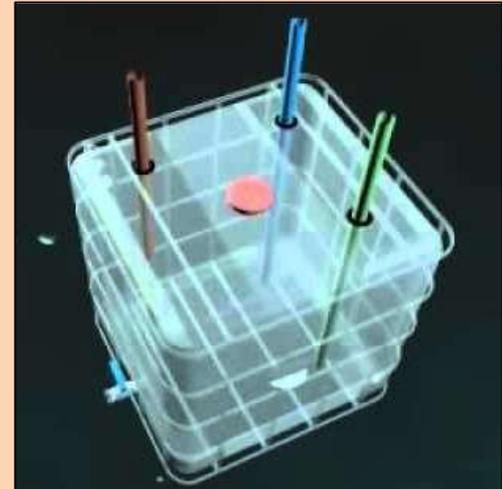
Progress so far

- Site visit to the Brainhouse School in April 2017.
- Met with the head teachers to discuss the plans and confirm their requirements.
- Measured up the school and the proposed area where the new toilet block will be built.
- Sourced and priced the materials required from local vendors and tradesmen.



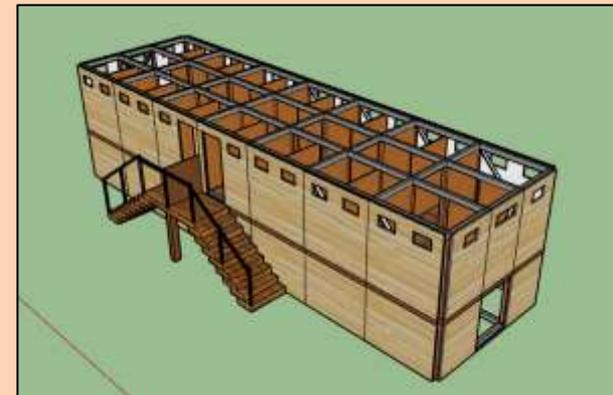
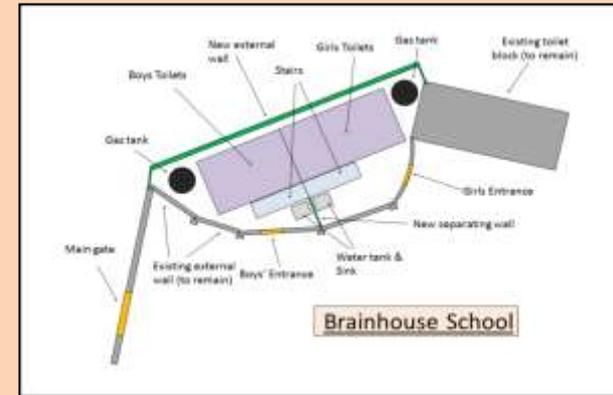
Progress so far

- Proof of concept
- Built a prototype bio-digester in the UK - a small scale 200 litre digester with a 5 litre floating gas tank.
- Extensive research into small-scale biogas technologies.
- The Green Toilets will incorporate the Solar Cities IBC bio-digester design: a robust, simple solution that has been widely tested around the world.



Progress so far

- After developing several potential options, a design for the Green Toilets system was finally chosen.
- The key features of the chosen design are:
 - A robust and secure 2-storey steel structure.
 - Fits within the available land and site constraints.
 - Meets the school's requirements for 23 toilets, including 2 larger cubicles with sinks to assist with the Girls Health project.
 - Accommodates the well-established IBC bio-digester design.
 - Gravity fed to avoid any pumping requirements.
 - Rainwater harvesting for handwashing facilities.
 - Toilet lighting from Pee Power and solar power.
 - Built by local tradesmen and labourers using locally available materials.
 - Simple, low-tech, low cost and easy to maintain.



Progress so far

- Secured the land required for the new toilet block.
- Construction work begins! Land clearance and building the new boundary wall.



The Next Steps

- Build the external structure.
- Install and commission the biodigesters, gas storage tanks and cooking stoves.
- Train the staff and older students on how to maintain the toilets and respond to any performance issues.
- Monitor performance over the following 12 months.
- Celebrate the successful completion of the Green Toilets Project.



One Final Hurdle

- The Charity currently doesn't have enough money to complete the project.
- To help support this amazing project and provide Brainhouse School with new, sustainable toilets, please visit and donate on the Just Giving fundraising page: www.justgiving.com/fundraising/acefgreentoilets
- All donations are very welcome. For individuals, companies and organisation with bigger budgets, please consider sponsoring a green toilet. For a £1,500 donation, you can sponsor the toilet and choose to decorate it with your logo, a picture, or however you want. Donations can be made on the Just Giving page, or for further information, please contact: elizabethjane07@gmail.com



Thank you



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