

“For all of us who are involved in the world of architecture and design, sustainable construction is a very important responsibility.”

Enrique Norten, Head Global Holcim Awards jury 2012



# Sun, wind and water

At the age of 18, Francis Kéré moved from Burkina Faso to Berlin to study architecture. Today he commutes between two worlds: his original home in Africa and his new home in Europe. As a bridge builder between the two cultures, he has spent more than a decade cultivating an awareness of the value of education in his native village where, in collaboration with the local community, he has been the driving force behind a school complex.



Diébédo Francis Kéré.







The 3000 or so inhabitants of Gando live in scattered settlements; the new secondary school provides a new center for them. Almost half of Burkina Faso's population is under 16 years of age – which makes it all the more important to provide good educational opportunities.

Some of the projects awarded prizes in the Holcim Awards competition are organized by public authorities. Others are initiatives of imaginative teams. And yet others are the inspiration of a single person – like the Global Holcim Awards Gold 2012 winning project. Without Diébédou Francis Kéré, born in 1965, the prizewinning school complex in Burkina Faso would not exist. Although the project is the result of the efforts of many people – and Francis Kéré not a person to hog the limelight – one point is undisputed: he is the father of the school in Gando. And like a good father, he works passionately to ensure that his child flourishes, grows bigger, and will one day be independent.

#### Headman's son without privileges

Francis Kéré's homeland Burkina Faso in West Africa is located in a very hot part of the southern Sahel zone. The country is one of the poorest in the world, but politically stable. Three quarters of its 17 million inhabitants live in rural areas. Francis Kéré, too, is one of this majority, the eldest son of the headman of Gando, a village about 200 kilometers south

“I wanted to help to develop my village. But I wanted to offer the community more than just money.” **Francis Kéré**

of the capital Ouagadougou. The fact that his father was the headman does not mean that he was privileged, the architect emphasizes. “On the contrary, it is a heavy burden to be the headman's son. This duty no longer has any formal power, nor does it generate income.” Francis was sent to school so that at least one person in the family would be able to read and write; up until then any letters that his father received had to be read out aloud by a government official. The decision to send him to school was an enormous step. In Burkina Faso even primary education cannot be taken for granted. Because many children have to work in the fields, they do not attend school, the outcome of which is that only one in four adults in Burkina Faso is literate. Francis made the best of the opportunity offered him. He was such a good pupil that he was selected for a vocational school in the provincial capital. After training as a carpenter and joiner he set out for the capital to look for a job. “There,” he tells us, “I learned that Germany was offering a university scholarship. I applied – and got

it!” At the time he had just turned 18 and did not speak a word of German. “It was simply mindboggling. To start with, the flight taking me away from my country was an unforgettable experience: looking down I saw the world get greener and greener, and suddenly there was this huge stretch of water – utterly inconceivable to me.”

#### Help for self-help

According to African tradition, each person has to care for other members of his family – and of his community, too. Kéré explains: “If a person leaves his community to seek a better life, he tries to make up for the gap he leaves by providing financial support.” So it is expected of someone like himself that he will make a contribution to improve living conditions in the village. “Anyone in my position would act in the same way: I wanted to help to develop my village. But I wanted to offer the community more than just money.” In Europe he realized how important education was for social and economic development.

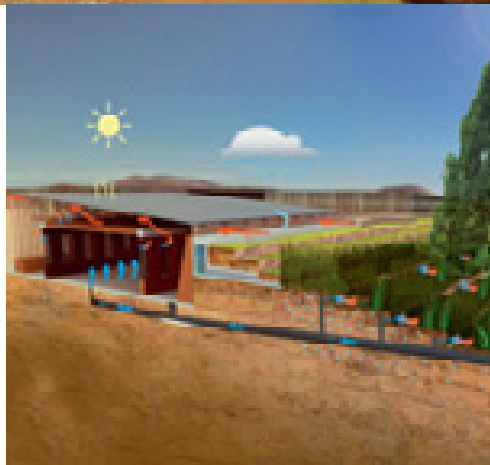




“That is what motivated me to establish a good school in my village that would be attended by as many children as possible. This would be flanked by smaller development projects to help the standard of living in other ways.” It was clear to him from the start that in the long term all projects would have to be run by the village itself; hence his insistence on ‘help for self-help.’ “I have nothing against giving hungry people a meal and food aid,” he says. “Indeed, after a natural catastrophe it is our duty to help victims to survive. But in the case of honest, sustainable development aid other considerations have to take precedence. We have to try to teach people to fish rather than always give them fish.”

#### Accolades galore

The architect knew that the old school in Gando had been severely neglected and was in danger of collapsing, and he wanted to replace it with a new building. He took the most direct route to fund his project: as architecture student at the Technische Universität Berlin, he persuaded his fellow students to give up a few cigarettes and use the money saved to buy one or two symbolic bricks for the school, in other words to donate a few coins for Gando. The campaign was a great success; you believe Kéré immediately when he states quite matter-of-factly: “I can mobilize and inspire people.”



The ventilation system is as simple as it is ingenious: the hot wind is cooled in the moist, shaded mound, before flowing through underground pipes into the classroom. The expansion of hot air in the space between the ceiling and roof draws in the cool air.

In 1998 he and friends founded an association, Schulbausteine für Gando (Bricks for the Gando School), which took charge of the project’s funding. The new building, which cost about EUR 30,000, was opened in 2001.

Irrigating the mango trees: clay vessels filled with water stand next to the plants, each with a small hole in the base, through which as much water as the plant needs constantly seeps. The containers are filled by the pupils and teachers once a week.

Francis Kéré was guided by the principles of sustainable development and local traditions and materials. Thanks to thick earth walls, ventilation openings, and a roof with a large overhang, the primary school building has a pleasant ambient climate. The government provided teachers, the school filled with children immediately – and suddenly everybody was talking about it. In 2004 it received the Aga Khan Award for Architecture, the most important architecture prize in the Islamic world. This was followed in 2007 by the Zumbel Award for Sustainable Architecture, in 2009 by the Global Award for Sustainable Architecture, and in 2010 by the BSI Swiss Architectural Award. Despite all this recognition, Kéré has not rested on his laurels – on the contrary. In 2007, the teachers’ accommodation building in Gando was completed, and in 2008

“While the women produce the traditional earth floor, the men press the earth bricks for the walls.” **Francis Kéré**



“What we are doing here is more than just architecture or development aid.” Francis Kéré

the extension to the primary school. At present a public library and a women's center are under construction.

### Earth is good

Francis Kéré applies fundamental principles of sustainable development in all his projects in Gando. The village community is heavily involved in the development process and in the construction work. As a result, the inhabitants quickly identify with the project – and learn new skills on the job. “Earth is often regarded as a building material for poor people,” the architect comments, “which is why people prefer expensive imported building materials that are then often used utterly wrongly.” By enhancing the earth and providing solid, constructive solutions, Kéré wants to raise acceptance of the free and inexhaustible natural building material. The Gando school project trains young people. They learn how to make bricks and how to work with modern building materials such as cement. Their training may also help them find work in the village, which will slow emigration and secure Gando's future. “What we are doing here is more than just architecture or development aid,” Francis Kéré states. “It is a compelling social event. While the women produce the traditional earth floor, the men press the earth bricks for the walls, sweep the gravel, and collect natural stones for the foundation.” All of them want to work on the building, and usually there are far more volunteers than needed. As payment, workers receive a meal at midday – “And suddenly there was not enough rice and beans.” Long ago the village community decided their school would also be their community center, where meetings take place and vaccination programs are carried out.

### The importance of agriculture

One of Francis Kéré's objectives in Gando is reforestation. In his studio in Berlin he tells us that “We haven't learned to replant – we always thought that nature would take care of things. And things were indeed fine for a long time. In recent years, though, infant mortality in the region has fallen so rapidly that a veritable population explosion has occurred. Natural resources are being consumed at a tremendous pace and the forests are being chopped down.” Under early efforts at reforestation, eucalyptus trees were planted – a bad mistake and it is now known that they deplete the soil and impoverish nature. “I hate this stuff; it grows like crazy,” Kéré says laughing. He proposes using the good eucalyptus wood for construction and planting mango trees instead. Francis Kéré attaches great importance to agriculture in general. The pupils and teachers also

cultivate a vegetable garden, which provides an additional source of food for the pupils and also combines academic education with practical activities. This is a way of avoiding potential mistakes: “Children will still be able to work as farmers later. The school has not removed them from their traditional structures; on the contrary, they have learned a lot of new skills.” The school opens up new opportunities without shutting out existing ones.

### A commuter between two worlds

Owing to the diverse projects in Gando, Francis Kéré is a famous man in Burkina Faso. More and more people approach him with their concerns in the hope that he can help them. These expectations put a certain pressure on him. But he himself also puts pressure on others: “Communities are demanding that many people now living in towns and cities should also act like this person in Gando.” Francis Kéré's enthusiasm is infectious. He finds “life as an architect very tough.” On occasion he flies to Burkina Faso three times a month on account of the projects. Until recently he was an assistant at the Technische Universität Berlin as he was not sure whether he could survive on his income as a freelance architect. In the meantime, he is completely self-employed. At present he is designing part of the Museum of the International Red Cross in Geneva. A high-profile initiative is Operndorf Afrika, the opera village in Burkina Faso that he and the late German director Christoph Schlingensiefel initiated. “But 80 percent of my work is socially oriented; a lot of the projects I do I can barely live on. But I must add: what I get back from people, you can't put that in words.”



### The journey goes on

For that reason he continues to work tirelessly on his complex in Gando. “At the beginning I just wanted to build a tiny primary school; but you only live once. And who gets the opportunity to design his environment in the way that I can now in Gando?” Because of the importance attached to literacy in Burkina Faso, many primary schools were built – and secondary education was largely forgotten. Many young people have received only a primary school education and are not qualified for skilled occupations; a primary school education is not enough,” Kéré remarks. So he is now building a secondary school in Gando. For his design he won the Holcim Awards Gold 2011 Africa Middle East and the Global Holcim Awards Gold 2012. In size alone the project eclipses everything that has been built in Gando. Covering 3,800 m<sup>2</sup>, the new school is 12 times as big as the primary school opened in 2001 – and at EUR 200,000 costs almost seven times as much. Its 12 classrooms in five buildings around a central courtyard can accommodate 600 students from the wider





Kéré's previous buildings in Gando were built using loam block. The walls of the secondary school however are being constructed of individual wall panels, cast in a two-piece steel form using unsieved loam, cement, gravel and lime. Slightly curved, the wall panels are inherently stable and stiff. Ringwall lintels and joints between the panels are in concrete. Up to three wall panels can be fabricated on site in two days by the people of the village under supervision of specialists trained by Francis Kéré.

region. The building incorporates all the experience that Kéré and his co-workers have accumulated in Gando to date – and a series of other innovations. “The school is intended as an oasis where people love to learn,” Kéré says, “and as a ground-breaking commitment to Burkina Faso, inasmuch as it is in striking contrast to the slipshod schools thrown up elsewhere.” The rooms are constructed on a raised base and covered by a roof with a large overhang. This protects the load-bearing walls of compressed earth, which are covered with a coat of varnish. The massive earth walls and massive ceiling keep the sun from heating up the classrooms too quickly. Large openings in the gable walls ensure sufficient cross-ventilation.

#### “The main thing is that it stands!”

These measures do not go far enough for Francis Kéré. “I would like to build very, very cool rooms,” he says. Accordingly, a special cooling system was developed for the school, as simple as it is ingenious. An artificial mound of earth

is banked up against the rear wall of the school building. It is covered with vegetation and shaded by large mango trees. The earth of the mound is kept permanently moist with rainwater collected in underground cisterns – Burkina Faso can get very heavy rain at times. The hot wind now flows through openings into the cool hill and is filtered and cooled in the process. The air flows then through underground pipes toward the classrooms and is cooled further in the process. Finally, in the classrooms it rises as a cool, initially still moist breeze. Suction is created by the movement of the air in the space between the sloped roof cladding and the ceiling – this air is warmed by the sun, expands and flows out, drawing behind it through an opening in the ceiling the air rising through the floor. Kéré is convinced that “This system keeps the air in the classroom between six and eight degrees cooler than the air outside, and the perceived difference is much greater than that.” The cooling system is based on a combination of solar, wind, and thermal energy. The school uses hardly any electricity: just a little for artificial lighting and the school computer.



Eventually electricity will be provided by solar panels. Francis Kéré was long opposed to this because the villagers cannot afford solar panels and the school is intended to be a showpiece of local technologies. “However, we have not found another alternative.” Otherwise the materials used for the school are as simple as possible. The massive base is made of granite, the roof is corrugated iron, and the structure consists of thin reinforced metal. The unpopular eucalyptus wood is also used in the construction. Numerous details still have

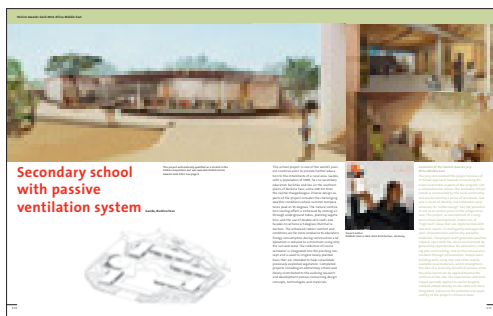
“The school is intended as an oasis where people love to learn.” Francis Kéré





Everyone wants to work on the building: While the women produce the traditional earth floor, the men press the earth bricks for the walls.

to be decided. According to the architect, he works in Gando just as he would in a studio – much is decided on site. “It always depends on what is available at the time,” the pragmatist maintains. He says that he is not interested in sustainability per se. “I never thought: now we are going to look for a really intelligent material. All I thought was: this material is there. I am happy to combine materials with corrugated iron and steel – the main thing is that the building stands and can be managed by the local people!”



In the regional phase of the 3<sup>rd</sup> Holcim Awards competitions, this project was awarded Gold in Africa Middle East. See page 170.

Project appraisal by the Global Holcim Awards jury

## “An example for new sustainable construction.”

Burkina Faso is amongst Africa’s poorest countries and is situated in one of the hottest arid zones in the world. Hence, basic education and appropriate living conditions based on personal responsibility are dominant issues on the country’s path to a sustainable future. The secondary school in Gando is a lighthouse project providing outstanding contributions in this respect.

The jury was unanimously impressed by the school’s beauty and its innovative architectural concept, which combines both modern and vernacular construction methods, as well as by its social and educational impact. Locally-sourced clay is mixed with aggregates and cement to cast walls on-site based on a two-piece formwork. The school also shows how a low-tech, energy saving and low-cost climatic concept can be used in extremely hot weather conditions. Technical solutions including passive ventilation, underground cooling, and automatic irrigation are integrated into the architectural solution. Reforestation, greenery, stack-effect

air currents, and double-skin roofs and façades are other important sustainable components of the clay building. To fight against the ongoing expansion of the desert and to prevent the dehydration of the ground, rainwater is captured and centrally stored for irrigating the newly-planted trees in the area. From a materials and technology perspective, the secondary school in Gando will set an example for new sustainable construction – not only in the arid Sahel, but in all developing regions around the world.

The project provides more than just a testament to the potential of locally-sourced materials. Built by the community, the construction process is considered to be an important part of the transfer of knowledge, whereby locals acquire new building skills that can be reused and taught. This common effort and on-site training of the residents in the vicinity of the new school substantially increases social cohesion among families and self-reliance of the whole community.

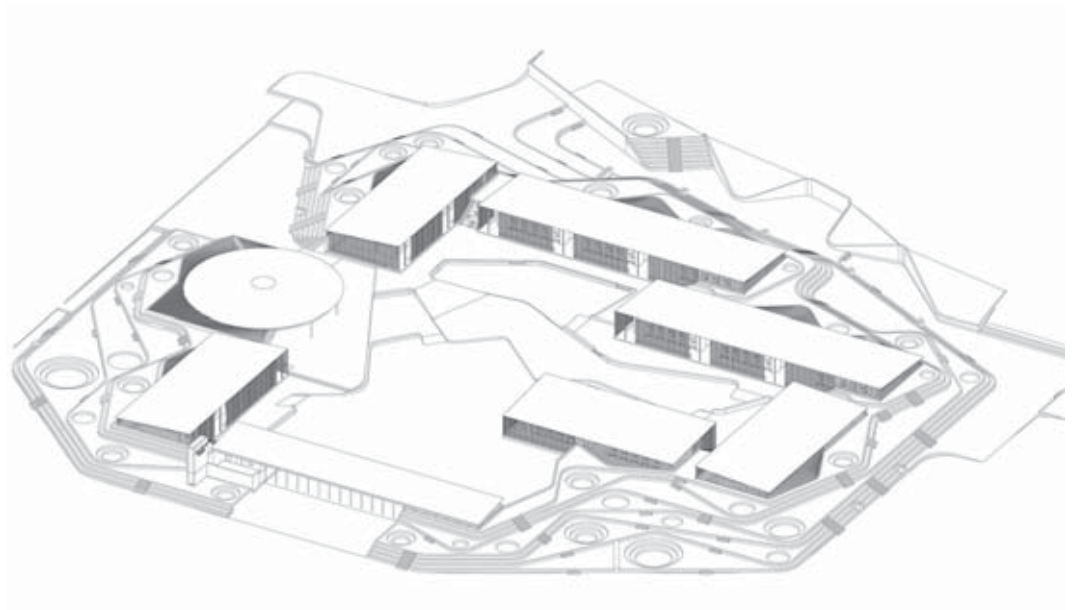
The jury commended this project due to these multifaceted and future-oriented elements. The comprehensive approach to this school project is an exemplary application of sustainable construction according to the five “target issues” for sustainable construction of the Holcim Foundation, and will have an undoubtedly strong impact on similar endeavors in developing regions.



# Secondary school with passive ventilation system

This project automatically qualified as a Finalist in the Global competition and was awarded Global Holcim Awards Gold 2012. See page 8.

Gando, Burkina Faso





This school project in one of the world's poorest countries aims to provide further education to the inhabitants of a rural area. Gando, with a population of 3000, has no secondary education facilities and lies on the southern plains of Burkina Faso, some 200 km from the capital Ouagadougou. Diverse design aspects of the project consider the challenging weather conditions where summer temperatures peak at 35 degrees. The natural ventilation cooling effect is enhanced by routing air through underground tubes, planting vegetation, and the use of double-skin roofs and façades to achieve a 5 degrees thermal reduction. The enhanced indoor comfort and conditions are far more conducive to education. Energy consumption during construction and operation is reduced to a minimum using only the sun and wind. The collection of scarce rainwater is integrated into the planting concept and is used to irrigate newly-planted trees that are intended to help consolidate previously exploited vegetation. Completed projects including an elementary school and library contributed to the evolving research and development process concerning design concepts, technologies and materials.



Project author:  
Diébédo Francis Kéré, Kéré Architecture, Germany.

#### Comment of the Holcim Awards jury Africa Middle East

The jury commended this project because of its broad approach towards enmeshing discreet sustainable aspects of the program into a comprehensive whole. The *Secondary School Gando* is constructed by the local community and builds not only a series of structures, but also a sense of identity and enhanced social cohesion. Its "urban design" has the potential to act as an anchor point in the village structure. The project, as one element of a long-term school development, makes use of "high-tech" ideas that are implemented with low-tech means. It intelligently leverages the site's characteristics and locally-available materials. The project itself generates positive impacts upon both the social environment by generating opportunities for education, creating jobs and training; and on the natural environment through reforestation. People learn building skills using clay and other readily available local materials, which strengthens the idea of a mutually-beneficial process since the skills learnt can be applied beyond the confines of the site. The experiences and techniques partially applied to earlier projects realized independently on the same site were integrated, and prove the potential and applicability of the project's inherent ideas.



# Global Holcim Awards jury

Zurich, Switzerland, March 15, 2012



- 1 **Rolf Soiron**, administrator, Switzerland
- 2 **Mario Botta**, architect, Switzerland
- 3 **Maria Atkinson**, administrator, Australia
- 4 **Yolanda Kakabadse**, administrator, Ecuador
- 5 **Werner Sobek**, civil engineer, Germany
- 6 **Julia Marton-Lefèvre**, administrator, France/Switzerland
- 7 **Aaron Betsky**, architect/critic, USA
- 8 **Enrique Norton**, architect, Mexico/USA (Head of the jury)
- 9 **Hans-Rudolf Schalcher**, civil engineer, Switzerland
- 10 **Rahul Mehrotra**, architect, India