empowering people. **Award**

Technologies for basic needs

Winning Solutions
Nairobi, 30 October 2013

www.empowering-people-award.org

SIEMENS | Stiftung

Contents

Foreword

Promoting technical solutions for human needs

Millions of people in developing countries face urgent challenges in their daily lives such as a lack of basic services, health issues and scarcity of food, energy or clean water. However, sustained social and economic growth can often be reached with the help of innovative technologies. These provide the chance to level out acute deficits and offer diverse opportunities for independent economic activities and income generation. This applies just as much to high-tech solutions as to simple and intelligent technologies, which can often be easily implemented in a time- and cost-effective manner.

Empowering people to improve basic supply for themselves and for their families in an independent way is the main objective of the Siemens Stiftung. To achieve this, we aspire to initiate and to promote social entrepreneurship models which use simple and appropriate technological solutions to reach improvements in infrastructure and income generation.

By launching the “empowering people. Award“ we initiated a worldwide competition for practical inventions, which are designed to help improve the living conditions of people in developing countries and to further social development. Although dedicated inventors all over the world have already developed and tested numerous such solutions, these mostly do not reach those who need them most. Even experienced practitioners working in development cooperation often come across the right solution for a specific problem only by pure chance. As a consequence, costs are incurred where they could have been avoided and valuable synergy effects are lost.

This is where the “empowering people. Award“ intervenes. The competition aims to identify and promote urgently needed appropriate technologies. By collecting best-practice solutions and making them accessible to all players in the development context, we want to foster their implementation on a global scale. We are convinced that transparency, the transfer of knowledge and cooperative partnerships are essential prerequisites for the targeted improvement of daily life in impoverished regions.

The competition received acclaim all over the world and indeed uncovered great potential. Over 800 submissions from over 90 countries reached us and were evaluated in detail by experts. Over the next few pages, we are delighted to present the winners of the “empowering people. Award“ – solutions that are impressive due to their brilliant simplicity and practicability. These solutions are representative of the extraordinary creativity and power of innovation that can be found in the numerous other entries which did not make it onto the shortlist.

Congratulations to the 23 winners of the “empowering people. Award“!

Rolf Huber
Managing Director of the Siemens Stiftung

The Partners

The “empowering people. Award” is supported by selected organizations.
The Siemens Stiftung would like to thank the following partners for their support:

KfW
KfW (business area development bank) finances investments and consultancy services in over 100 countries, in particular on behalf of the Federal Government. Reducing poverty, peace-keeping, the protection of the climate and environment as well as shaping the globalisation agenda are at the forefront of its work. For this purpose, the KfW promotes reforms, infrastructure and financial systems for social and eco-compatible economic growth in its partner countries. As part of KfW Bankengruppe, the development bank business area uses own funds for development projects.

Helmholtz Association
The Helmholtz Association is a community of 18 scientific-technical and biological-medical research centres. The Association has been commissioned with pursuing basic research on behalf of the state, the economy and society. It strives to gain insights and knowledge so that it can help to preserve and improve the foundations of human life. It does this by identifying and working on the grand challenges faced by society, science and industry. Helmholtz Centres perform top-class research in strategic programmes in six core fields: Aeronautics, Space and Transport, Earth and Environment, Energy, Health, Key Technologies and Structure of Matter.

AT-Verband
AT-Verband (AT-Association) is an association that stands for advanced socially and environmentally sound technology practice. AT-Verband has been registered in Germany as a non-profit organisation since 1988. The 30 members are independent consultants, researchers, trainers, institutes and consultancy companies. AT stands for a qualified technology practice that enhances conscious choice by the users and enables them to develop or apply technical solutions that are in their own genuine interest.

The Jury

An international and interdisciplinary jury offered its support in selecting the winners of the "empowering people. Award".

Prof. Daniel Fletcher
Lloyd Distinguished Professor of Bioengineering and Biophysics
University of California Berkeley

Dr. Christoph W. Frei
Secretary General
World Energy Council (WEC)

Tanja Gönner
Chair of the Management Board
Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ)

Prof. Dr. Peter Gruss
President
Max Planck Society

Wolfgang Hafenmayer
Managing Partner
LGT Venture Philanthropy

Manuela Kasper-Claridge
Head of Economics Department
Deutsche Welle-TV

Thomas Loster
Chairman
Munich Re Foundation

Dr. Peter Muchiri Ngatia
Director of Capacity Building
African Medical & Research Foundation (AMREF)

Felix Oldenburg
Europe Leader and Director Germany
Ashoka

Stephan Opitz
Director General for Policy and Latin American Region
KfW Development Bank

Dr. Dorothea Ringe
Head of Strategy and Finance
Oxford Entrepreneurship Centre

Gerry Salole
Chief Executive
European Foundation Centre

Mirjam Schöning
Senior Researcher at the Skoll Center
Said Business School, Oxford University

Prof. Dr. Dr. h. c. Georg Teutsch
Scientific Managing Director
Helmholtz Centre for Environmental Research

Prof. Dr. Klaus Toepfer
Executive Director
Institute for Advanced Sustainability Studies (IASS)

Simon Trace
Chief Executive
Practical Action

Jean-Luc Vincent
Founding President
International Exhibition of Inventions of Geneva

Gavin Lindsay Wall
Director
Rural Infrastructure and Agro-Industries Division (AGS) of the Food and Agriculture Organization of the United Nations

Milestones of the “empowering people. Award”

16 June 2012
Launch of the ”empowering people. Award” at the United Nations Summit for Sustainable Development in Rio de Janeiro, Brazil

31 January 2013
Close of competition with

800 entries from 90 countries

16 September 2013
Shortlist is published, “empowering people. Award” website is relaunched, Community Voting starts

30 October 2013
Award Ceremony in Nairobi, Kenya

Prize Money
1st Prize €50,000
2nd Prize €30,000
3rd Prize €20,000
and 20 x €5,000

February – June 2013
Expert panel evaluates all entries and finalizes shortlist

July – August 2013
Jury selects the top three winners

from November 2013
Creation of “empowering people. Platform“

2012 | 2013

mber | January | February | March | April | May | June | July | August | September | October

1st

1st Place
OneDollarGlasses

The Solution
The OneDollarGlasses are manufactured on bending and milling machines specially designed for this purpose. The spectacle frames consist of a lightweight and flexible frame made of extremely robust, rustproof and hypoallergenic spring steel wire (1mm). The frames are manufactured by hand on a bending device which does not need a power supply. Different physiognomies can be taken into account individually when bending the frame. The elliptical polished, unbreakable lenses are given the notches and steps for fastening in the spectacle frames on the milling attachment and can be inserted in no time. This milling machine can be operated via a decentralized power supply thanks to the low power consumption (generator or solar station). Heat-shrinkable sleeves made of hypoallergenic plastic on the ear piece ends increase the wearing comfort of the glasses. As the glasses have very little weight, they do not require nose-bridges. Two coloured glass pearls give each pair of glasses its own personal design.

Background Information
Figures from the WHO show that around 150 million people in the world suffer from defective eyesight which could be rectified with a simple seeing aid. However, many of these of these people live on a very small budget which prevents them from buying a conventional pair of glasses. This has serious consequences for them: Their poor vision prohibits people from working or pursuing vocational training – the resulting loss to national income worldwide is estimated to be around 120 billion dollars per year.
Until now, people in developing and emerging countries have mainly helped themselves by recycling old glasses – but these are difficult to recondition and adjust. Additionally, there is often a lack of local knowledge and technical equipment. Another economic alternative could be glasses from China. However, these have not reached a sufficient distribution so far, because costs are still too high (due to shipping in regions off the major trade routes) and appropriate distribution structures are missing.

Social Impact
The glasses are also affordable for very poor people due to low production costs. The correction of defective eyesight is an important prerequisite in order to, for example, be able to pursue gainful employment. The attractive design also helps to give people the confidence to wear the glasses in public – often being the first in their village to do so. The production can be done locally by spectacle manufacturers who have to attend a 14-day intensive training course on the equipment. These craftsmen work independently and on their own responsibility. The production of the glasses can take place at home, so that especially women can work and take care of their children at the same time.
A production unit includes all equipment and tools necessary for the production of the glasses. It can be awarded in the form of a loan to a group of 4 or 5 persons, who in addition to funding the ongoing costs for materials can also repay the loan from the production and the sale of the glasses. After two to three years, the production unit becomes the property of the group. The area covered by a production unit can be increased considerably if mobile opticians use motorbikes to regularly visit the people in the villages.

www.onedollarglasses.org

Facts & Figures

Material: Spring steel wire (1 mm), plastic lenses, heat-shrinkable sleeves, pearls
Required training: 2 weeks
Time required for the production of 1 pair of glasses: 15 minutes
Production capacity of a unit (with trained workers): Approx. 100 glasses per day
Energy requirement: The milling machine requires electricity, but is tolerant towards voltage fluctuations. For example, the 12-V version can also be operated via a solar-charged car battery
Maintenance: Not necessary

Used by Countries
Africa: Rwanda, Uganda, Burkina Faso, Kenya, Ethiopia, Tanzania

Category
Healthcare

2nd

2nd Place
MakaPads Sanitary Pads

The Solution
MakaPads are sanitary pads made from papyrus and paper waste. The naturally absorbent material has a high capacity (one pad can be used for 8 to 10 hours). Contrary to most other sanitary pads on the market, there is no additional absorption enhancement required. They are assembled with a moisture barrier and mesh covering and can be purchased with or without an adhesive.
The dried and pulverised papyrus fibres are processed into a thick paste with paper and water. This is dried in the sun, smoothed, pressed and cut to size into absorbent inserts with mechanically operated machines. The pads are sealed in packs of ten and are then exposed to ultra violet light to kill off all bacteria or germs. Because the sanitary napkins are made of natural material and do not contain any chemical additives, they are almost 100% biodegradable and do not cause any intolerances. The mostly manual production process needs very little electrical energy and can be generated via solar panels of total wattage 350 W. Thus, Makapads are produced with minimum carbon footprints.

Background Information
In the west of Uganda, the average income of the population is less than 1.25 USD per day. A packet of normal sanitary pads costs twice as much – a luxury that only very few women can afford there. What applies for Uganda, applies to females in many other developing and emerging countries. Usually, women substitute sanitary pads with simple cloth rags, waste paper or banana leaves. Not only is this largely ineffective, the hygiene is also questionable. Such solutions constitute risks for the women's health. Due to a sense of shame, many young girls no longer go to school with the onset of puberty and women are no longer seen in public. The supply of disposable pads, e.g. by aid agencies, is a considerable cost factor and raises garbage disposal problems.

Social Impact
MakaPads protect women from health problems and discrimination and can help to reduce the high rate of early school leavers among girls. As the production of MakaPads does not require any special knowledge, they can be manufactured by people without training. This creates jobs for those who would otherwise have no chance of getting gainful employment. For example, Technology for Tomorrow Limited employs mainly women of a refugee camp in Uganda for the production of MakaPads and provides them with a source of income. Being produced from local materials, the producers are independent from imports or contributions to establish their own businesses. The use of natural raw materials ensures that no disposal problems arise. Alternative business models would also be conceivable, according to which smaller groups of women could manufacture and distribute MakaPads themselves. The concept is easily transferable.

www.t4tafrica.co

Facts & Figures

Material: Papyrus, (waste) paper,
Characteristics: 100% biodegradable, chemical-free
Energy consumption: Solar panels (of total wattage 350 W), direct sunshinerice

Used by Countries
Africa: Sierra Leone, Uganda

Category
Healthcare

3rd

3rd Place
Jompy Water Boiler

The Solution
The Jompy Water Boiler is a lightweight and inexpensive fire top device which sits between cooking pots on an open flame. It enables households to cook a meal while at the same time heating water to temperatures high enough to kill 98% of waterborne bacteria (according to entrants). As a result, the water is safe to drink and can be used for cooking or bathing. Gravity pushes the water through the Jompy Water Boiler, which then delivers near boiling hot water within seconds and at a rate of one litre per minute. It works equally efficient on stoves or simple three stone fires, making it suitable for the use in both rural areas and urban dwellings. Through a more efficient use of the cooking fire, the Jompy Water Boiler also dramatically reduces fuel costs for poor families.

Background Information
It is estimated that over a billion people worldwide are without access to clean drinking water. As a result, water-borne diseases such as diarrhoea kill 1.8 million people annually. Access to clean water alone could reduce deaths caused by diarrhoea by up to 25%. In 2011, AMREF concluded that water-borne diseases like diarrhoea, cholera or typhoid fever, are mainly caused by the lack of access to safe drinking water, to water used to wash hands, food or utensils before eating and also, by a lack of adequate sanitary facilities.

Social Impact
The Jompy Water Boiler reduces waterborne diseases by providing social, economic and environmental benefits. It pasteurizes water stemming from the commonly used, poor water sources, making it safe to drink and thereby reducing death rates and illnesses caused by diarrheal diseases. Clean water instantaneously improves hygiene and sanitation, and leads to better health conditions. Economically, users also benefit from the more efficient fuel use. Not only is the same fuel which is used for cooking also the source for water pasteurization, this heating process is also quicker than with conventional methods consumes less fuel and reduces CO_2 emissions. Jompy was used in Uganda during a 4-month field project and as part of this research the water quality was tested before and after using the water boiler. Alongside energy savings and water quality, health and social impacts were evaluated and in particular the benefits of savings in fuel, time and money were investigated. The results provided evidence of energy and CO_2 reduction, which results in time and money savings combined with improved quality of drinking water and hygiene, leading to better health conditions. An added benefit recorded by the families was the reduction in coughs and eye problems, previously caused by indoor air pollution.Families reported that they saved 3kg of firewood per day and more than 3 hours a day due to a shorter cooking period. They also needed less time to source firewood. Financial savings amounted to 1,800 UGX ($0.78 USD) per day, thus 657,000 UGX ($284 USD) annually. This represents between 30-60% of the annual household ncome of families it benefits, and could make the difference for children being able to attend school or not. The financial benefits of the Jompy use are even higher when counting in savings on medicine, time taken off work, looking after sick children or time taken to collect fire wood.

www.jompy.co.uk

Facts & Figures

Material: A micro-bored aluminum tube, coiled to a flat disc with a large heat conductive surface area 1 litre of water per minute can be heated to about 86 degrees
Characteristics: Suited for all types of cookers, even for 3 stone fire
Weight: 700g

Used by Countries
Asia: India
Africa: Kenya, Uganda

Category
Water & Waste Water
Energy

BioGas Backpack

The Solution
The Biogas Backpack is a pillow shaped balloon from flexible, gas tight material, plastic sheet and fabric. The two inner layers are made of gas tight PE-sheet, welded at the two open ends and equipped with a welded, threaded flange, holding a mini ball valve. The backpack is filled with biogas from the biogas plant by simple pressure equalization instead of by pump or compressor. Therefore, it does not need to be equipped with a security valve to release gas in the case of over pressure.To use the Biogas Backpack efficiently, it would make sense to produce the biogas in one central, technically advanced biogas plant. This way, farmers in the surrounding areas could contribute to the biogas production by selling substrate to the plant owner in exchange for biogas and fertilizer. Because of the limited amount of biogas, the high content (30-60%) of non-flammable CO_2 in biogas and the non-pressurized status of the gas, there is no risk of an explosion. Even if in contact with open fire, the backpack does not explode, but rather burns down in a controlled manner. To avoid accidents with leaking gas, the backpack is designed to be stored outside the house.

Background Information
Combustible materials which are used for cooking, such as fire-wood and charcoal, are associated with a range of problems in many countries. Gathering these materials is time-consuming and difficult, especially because they are often in short supply. In addition, cooking with these materials can cause significant health problems. Replacing wood fuels, biogas can alleviate such problems while simultaneously reducing deforestation and soil erosion. However, once produced in biogas digesters it is very difficult to transport the gas to the respective households.

Social Impact
The Biogas Backpack aims to provide poor rural households with an affordable source of energy for lighting or cooking, thereby improving living conditions. Helping to avoid the time consuming task of collecting fuel wood, the biogas backpack helps to ease the daily work of women in developing countries. In addition, health risks can be minimized as burning biogas is nearly smokeless. This solution was developed in order to facilitate the sale of biogas in developing countries and therefore makes it possible to start a business.

https://troz.uni-hohenheim.de

Facts & Figures

Capacity: 1.2 m³ of biogas
Weight: 4.4 kg (in a fully inflated state)

Used by Countries
Europe: Germany, Portugal, Switzerland,
Asia: India, Indonesia, Pakistan, Bangladesh, Malaysia, Nepal,
Africa: Tanzania, Botswana, Ethiopia, Kenya,
North America: Mexico

Category
Energy
Food & Agriculture
Waste Management & Recycling

ElectroChemical Arsenic Remediation

The Solution
ECAR is a highly effective ultra low-cost water treatment technology designed to bring locally affordable and sustainable arsenic-safe water to rural communities. In ECAR, or ElectroChemical Arsenic Remediation, ordinary steel plates use low voltage electricity to produce iron oxide (e.g. rust) particles in water that adsorb and trap arsenic. During the process, arsenite (which is more toxic and difficult to remove) is converted into arsenate, allowing the process to be highly effective under robust conditions. Treated water exceeds international WHO standards for arsenic and iron across many groundwater sources. The electrodes are cleaned by reversing the current, making operation and maintenance simple and non-hazardous. The technology was designed to work within a sustainable service delivery model that can cover the cost of an electricity source and still sell arsenic-safe water at a locally affordable price while simultaneously covering all costs. The requirements for maintenance are low and electrode passivation can be limited by reversing voltage regularly. Operating ECAR is simple and non-hazardous: voltage is very low (about 3 V DC) and no corrosive chemicals are needed. ECAR can be operated by trained local community members. Operating costs are extremely low (~ 0.04 USD/l), making it possible to sell the arsenic-safe water at a locally affordable price while simultaneously covering the expenses.

Background Information
An estimated 60 million people in low-income countries like South Asia are exposed to naturally occuring toxic arsenic, every time they drink from their local well. The arsenic crisis in the Bengal Basin has been described as the largest mass poisoning in human history. Arsenic is tasteless, colorless, odorless and its chronic ingestion leads to health problems, such as painful lesions or cancers, only in the long-run. Therefore, education is needed to raise awareness of the risks and to ensure the consumption of arsenic-safe water. Most solutions fail because their maintenance is being neglected.

Social Impact
In the preliminary testing at Jadavpur University (Kolkata), the prototype was placed in Dhopdhopi High School near Kolkata for a three-month field trial starting in October 2012. This village school received pipe water for approximately 1 hour per day (inadequate to meet the needs of 2600 students) and supplemented it with groundwater, which was contaminated with about 250 µg/l of arsenic. The prototype consistently reduced arsenic levels below the WHO recommended maximum contaminant level (MCL) of 10 µg/l over several weeks of operation by a trained community member. Educating young generations about the importance of water safety will give them the tools to make better choices for their communities in the future. Schools are therefore the natural choice to introduce the new water technology and were selected to test and operate ECAR 100l and 600l prototypes. Arsenic-safe water could also easily be included in the existing government sponsored midday-meal programs, opening up opportunities for subsidies to reduce the initial capital cost of a treatment center.

gadgillab.berkeley.edu

Facts & Figures

Material: Mild steel plates and an aluminium sulfate coagulant – both available in the region.

Assuming per capita consumption of 10l/day, this amounts to 1.46 USD per capita/year, or 10.22 USD per family/year, assuming 7 people per family. As comparison, it is estimated that an average family in West Bengal incurs a cost of 84 USD per year to consume water with more than 50 µg/l arsenic. This includes the cost of partially-effective preventative measures, medical expenditures, and loss of working hours due to illness, which can be attributed to arsenic poisoning.

Used by Countries
Asia: India

Category
Water & Waste Water

Eliodomestico

The Solution
Eliodomestico is an innovative solar distiller for households, designed to function without filters or electricity. The device is made from readily available materials, such as burnt clay and tin metal, and can be entirely produced by local craftsmen. The body is made of two earthenware parts. The evaporator (black boiler) and the condenser consist of tin-welded metal sheets. The freshwater bowl is made of clay. Its design takes into account the habit of transporting objects on the head. The choice of materials, shape and colors is also based on technical reasons, such as the thermal insulation, ventilation, heat resistance, absorption or exchange. In the morning, the dirty or salty water is filled in a water tank, and in the evening, clean water can be collected. The water evaporates and re-condenses in a portable recipient placed underneath the tank. The prototype model which has a diameter of 60 cm and a surface area of 0.28 m², produces 3 liters of freshwater per day. This results in the production of 10 liters per day per square meter of surface.

Background Information
According to figures estimated by the WHO, over a billion people worldwide do not have access to fresh drinking water. Immediate help can be provided by desalinating and/or sterilizing seawater or brackish water before drinking. Desalination plants are, however, very energy and maintenance intensive, making their usage in remote areas without connections to power grids impossible. The areas with the most severe water shortages are the warm, arid countries in Northern and Southern Africa and West and Southern Asia. As these are also the regions with the most intense solar radiation, using solar energy for the desalination and sterilization of contaminated or salt water can create a realistic opportunity for a new source of clean drinking water.

Social Impact
Eliodomestico is a simple device which delivers a basic quantity of clean drinking water in areas where salt or brackish water is prevalent as ground and/or surface water. The system can induce positive outcomes for local economies. It is designed to be entirely produced on site and can thus create small businesses and generate income for local people. The device is self-explanatory and requires no maintenance except cleaning. Its size can be adapted to the respective water demand, an output of 5 to 10 liters per day meets the needs of an average household. Lastly, the traditional forms and materials make the Eliodomestico highly recognizable and very easy to understand.

www.gabrielediamanti.com

Facts & Figures

Water filtration: 10 liters per day per square meter of surface
Material: Burnt clay and tin metal

Used by Countries
Europe: Italy

Category
Water & Waste Water

Embrace Nest: The Embrace Infant Warmer

The Solution
Embrace developed a low-cost and energy-efficient infant warmer, which addresses the key challenge of preventing hypothermia for infants with low birth weight in developing countries. The design looks like a miniature sleeping bag and incorporates phase change material, which maintains a constant, clinically ideal temperature for up to 6 hours. Unlike traditional incubators, it allows physical contact between mother and child, promoting the development of a strong maternal bond. It is an intuitive device that can be reused, sterilized and repaired locally. The design of the device incorporates a wax-like phase change material (PCM) which, when heated for 25 minutes using an electric heater, ensures that the infant remains in a clinically approved temperature for up to 6 hours. The device was engineered to minimize the heat loss from the PCM to its surroundings. The electric heater requires intermittent access to an AC power source; however, it can also run off a generator or any alternate AC power source. A new version of the infant warmer, which is heated by boiling water and would therefore be suitable for more remote and resource-poor areas, is currently under pilot testing.

Background Information
Approximately 15 million babies are born prematurely every year, not completing the 37 weeks of gestation, with numbers rising (WHO). According to a study conducted by the US organization March of Dimes, over one million of these premature babies die each year before completing their first month. Over 85% of all premature births take place in developing countries. 75% of these children could be saved if the simplest methods were employed, such as keeping the infants warm the first few days after their birth.

Social Impact
The infant warmer is a very useful and much needed device, as even the big hospitals in developing countries are often not adequatly equipped with efficiently working incubators. The device is made of a durable, hypoallergenic, bio-compatible, medical grade material that can be repaired easily in rural, resource poor areas. The infant warmer is designed to complement Kangaroo Mother Care (practice of providing warmth with skin-to-skin contact), because it enables physical contact between mother and child. Notably, it allows mothers to breastfeed and gives them the flexibility and freedom to work, to tend to family needs, and to perform other critical daily tasks.

www.embraceglobal.org

Facts & Figures

Material: Wax-like phase change material (PCM)
Energy Demand: Electric heater requires access to an AC power source for 25 minutes
Lifecycle: Can be repaired locally, sterilized and reused (estimated) 50 times

Used by Countries
Asia: Afghanistan, India, China
Africa: Somalia, South Sudan, Uganda, Zambia, Mozambique
North America: Mexico, Guatemala

Category
Healthcare

The Fish Farm

The Solution
The Fish Farm is a patented, micro-intensive fish farm designed within the confines of a 12-metre shipping container, delivering 2-4 tons of tilapia (or other species) annually. By placing a series of tanks, filters and pumps inside a container, the product immediately delivers a profitable, affordable, transportable and replicable aquaculture business into poor urban or rural communities.The Prototype comprises 6 tanks (in a row) of 1,500 liters each, a 200 liters solids filter (to deal with the solid waste) and a 5,000 liters bio-filter (to deal with the chemical waste), a circulation pump and an aerator. The Fish Farm dumps 1% of its volume per day to maintain water quality and it would be able to supply this fertilized water to the vegetable farmers. The Fish Farm only requires minimal space and the energy for its operation can be provided by solar power. The Fish Farm is a simple and environmentally compatible way of ensuring food security, creating jobs and making profits.

Background Information
With marine fish stocks depleting, the demand for sustainably produced and community based fish continues to rise. Globally, aquaculture is characterized by high investment, low employment and high technical skills and installations. “Advances in these areas can pay huge dividends in reducing hunger and poverty because fish and other aquatic organisms are a major source of food and income for poor people in developing countries. Millions more can benefit from increased investment in fisheries and sustainable aquaculture to make this sector a more powerful engine for poverty reduction.” (WorldFishCenter.org)

Social Impact
The solution supports sustainable aquaculture, which creates benefits by saving resources. Furthermore, the Fish Farm can contribute to a balanced diet due to the high quality protein in fish. Due to the moderate price of the fish, it is an affordable alternative and healthy protein supply for the people. Generating income, the fish can be sold to restaurants and/or directly to the population at retail prices. Also, communities can play a part in the production of food for the fish (e.g. maggot farms, snail farms, algae farms), as well as, in the filleting and packaging services. Each Fish Farm can bring 1-5 people into economic productivity.

www.tbp-philippi.org.za/

Facts & Figures

A minimum supply of reasonably clean water of 250 litres per day
A level ground area for the placement of the container(s)

Used by Countries
Africa: South Africa

Category
Food & Agriculture

Leveraged Freedom Chair

The Solution
The Leveraged Freedom Chair (LFC) was designed by the development team at MIT to help people with physical disabilities in developing countries and has been in operation since 2008. It has been tested in East Africa, Central America and India. The LFC uses a unique lever drivetrain which makes it faster than conventional wheelchairs and enables it to travel over extremely rough terrain. Instead of using gears and derailleurs which are likely to break under the rough conditions in developing countries, the user can change gears and achieves a 3:1 change in mechanical advantage by simply moving his hands up and down a set of levers that are connected to the drivetrain. Grabbing high on the levers provides more torque to get over obstacles, while grabbing low on the levers increases angular velocity for fast travel on smooth ground. By using common bicycle parts in the production of the LFC, the costs are kept low and users, even in rural villages, can easily repair and maintain the product themselves.

Background Information
Over 65 million people, an estimated 1% of the world's population, need a wheelchair. Providing wheelchairs which are applicable, well-designed, fitted and affordable, enhances mobility and also opens up a world of education, work and social life for those in need of such support (WHO). Donor-funded non-profit organisations have tried to aid by mass-producing and distributing hospital-style wheelchairs in developing countries. However, these have proven to be unfit for the terrain as they cannot cope with rough terrain and spare parts are difficult to procure.

Social Impact
The Leveraged Freedom Chairs enable mobility across long and difficult terrain. Therefore, they not only enhance a sense of independence, but also provide the opportunity to access education, employment and participation in community life.

http://goGRIT.org

Facts & Figures

Materials: Mild steel and bicycle parts, ensuring that spare parts are always available, even in the most rural village
Benefit: Comparative testing shows that the LFC is 80% faster than a conventional wheelchair on the road and that users can produce 50% more torque at the wheels, enabling them to overcome obstacles 0n the road.

Used by Countries
North America: Guatemala, Haiti
Africa: Kenya, Uganda
Asia: India, Philippines, Vietnam

Category
Healthcare

Mapeo de Napas con Georadar – Soil Research

The Solution
Georadar technology can be used to map and to determine the depth of water tables. Even without rain water, water can be provided for crops, if the roots come into contact with the water table zone. Georadar (GPR, Ground Penetrating Radar) is used as a non-destructive technique for low-depth subsoil investigation, which produces excellent results in terms of soil profile mapping. It consists of an electromagnetic waves unit and a second digital recording system unit. Wave reflection time delays and wave speed in the material containing the antennae, are used to deduce the depth at which the reflector unit (pipe) is located. The georadar generates a subsoil image with high lateral and vertical resolution which not only identifies specific objects, but also characterizes the area.
The depth of penetration and the resolution depend on which type of antenna is used. In high-resolution urban areas shielded antennas are used because they are better equipped to control noise and air reflections with high-quality imaging and a depth range of up to 10m. Estudio G&D uses existing technology in a new context. The innovation is a compact, small-scale technology, which makes it easy to transport. Thus big areas can be analyzed without costly and labor-intensive drillings. Deeper soil and ground water levels can also be detected.

Background Information
The problem of water shortage in developing regions does not only affect clean drinking water. Water consumption of households and businesses only constitutes one fifth of the entire water use – the lion's share is used on the production of food. The usage of groundwater is frequently inefficient and a key question for food security is therefore how efficiency can be increased. Due to climate change processes, such as longer drought periods or heavy rains, it has become increasingly important to know about the basics of farming.

Social Impact
The Georadar can boost crop yields at locations with underground water tables. When the location and distribution of water tables are known, hybrids and fertilizers can be selected according to the amount of water which is available. Thereby, crop yields are maximized and the water is used more efficiently. There is no need for a destructive technique for low-depth subsoil investigation. Crops can be grown regardless of the climate situation and can secure an economically profitable output. Knowledge about water retention capacities or groundwater can help to provide water for crops independently of precipitation, because the roots of the crops can draw water from the water table zone. Such improvement of ground water use will help farmers to make their operation more stable. This knowledge could also give useful information for soil preparation, e.g. quantifying supply of soil conditioner in form of compost, adapted fertilizer utilization etc. Due to the relatively high purchase costs, the service should be provided on the regional or local (village, cooperatives) levels, or by big farms.

www.estudiogyd.com.ar

Facts & Figures

Components: 1 electromagnetic waves unit, 1 digital recording system unit
Depth of penetration/ resolution: Up to10 metres using antenna with frequencies between 10 MHz and 1,000MHz
Result of investigation: Subsoil image with high lateral and vertical resolution that characterizes the soil

Used by Countries
South America: Argentina

Category
Water & Waste Water
Food & Agriculture

Mobile Charging Kiosk

The Solution
The Mobile Charging Kiosk (MCK) is a mobile charging point, which can be attached to bicycles and mopeds. It offers a micro solution to quickly charge cell phones for people on the go, using renewable energy technology. The Quick Charge has two retractable solar panels with 40 watts each at the top, a lock system to keep the cell phone system and the solar panels secured at night, as well as, a lithium battery to store electricity for night charging. A manual charging mechanism can be used when the device is in a stationary position and in the case of bad weather. Since the whole system is on wheels, MCK can go where the customers are or where they gather, such as at market places, churches or bus stops. The whole unit is fitted onto a plastic body, which can also offer space for advertisement. However, the kiosk does not only offer charging services but is also a one-stop micro shop selling phones, renewable lights and airtime electronically.

Background Information
It is an undisputed fact that mobile phones can drive progress in developing and emerging markets. Due to technological advancements in mobile services, the prices for mobile phones have become so low that access to mobiles is widespread. Charging these phones, however, is often a significant problem. In many countries, mobile penetration has far outpaced the growth of the electricity grid, and even when it is available, the connection is often unaffordable and/or unreliable. This means that people often have to undertake long journeys to reach the next power source and that there is a huge demand for affordable backup options.

Social Impact
Mobile phones do not only foster communication, they are also an important source of information and offer a constantly growing range of services, such as mobile payment systems or agricultural information. MCK allows people with limited access to electricity to solve their phone charging needs without having to walk miles to a charging station. These units can be deployed in a franchise system, creating sources of income for people in these areas.

www.a-r-e-d.com

Facts & Figures

Material: 2 retractable solar panels (40 watts), lithium battery, wheels, aluminium frame, alternator 150W, sim card

Used by Countries
Africa: Rwanda, Burundi, Uganda

Category
Energy

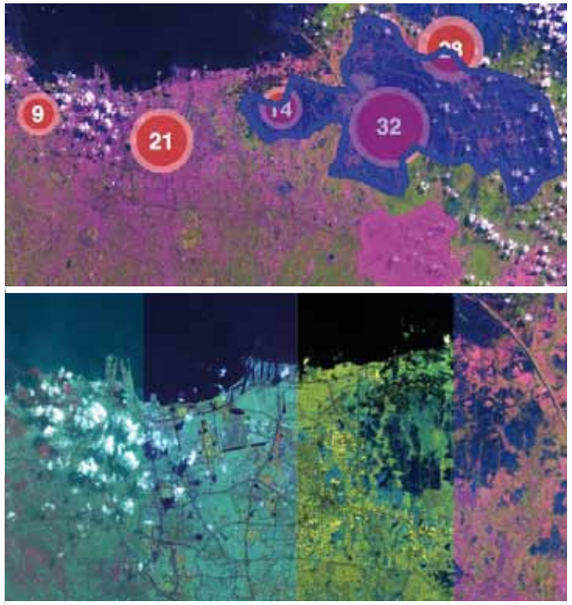
OpenIR – Democratizing Infrared Satellite Data

The Solution
OpenIR is an ICT (information communication technology) that maps the environmental risks and features, which are revealed by infrared satellite data. This includes algorithms for flood risk map generations and a web map application. OpenIR's initial validation case will take place in Indonesia. At the same time, OpenIR collaborates with FEMA (Federal Emergency Management Agency) to determine additional validation and use case scenarios. OpenIR also works towards interfacing flood risk maps with crowd maps and allows global access to this data.OpenIR's initial component is a geo-server system that serves visible and infrared spectrum data into web map layers. Currently, the team runs tests on processing and serving data in-house and/or using data from Google's Earth Engine that will soon be available.The team created a prototype of a Risk Map Builder, which automatically generates a flood risk map for any given area. The goal is to expand the resolution based on additional inputs. OpenIR exists as a prototype that is currently undergoing user testing and data validation.

Background Information
Since the tsunami in 2004, Indonesia has strengthened its crisis response systems. However, as a recent Jakarta Globe article points out, preparedness systems are still underdeveloped. At the same time, increasingly severe weather phenomena worldwide make access to standardized risk maps more important than ever. Digital Maps using infrared satellite data are a powerful way to protect land, the ecosystem and its inhabitants. It is important for the software to be made available to users in developing countries, which are more environmentally and ecologically vulnerable. This could contribute to an environmental visualization system in even deeper and detailed ways.

Social Impact
OpenIR's work with the Indonesian government, universities and NGOs through community partners, will help all parties to better understand how a standardized environmental mapping system with easily comprehensible risk maps can be used for planning and prevention. OpenIR's initial focus is on Indonesia, a country at the intersection of economic and environmental vulnerability. However, as OpenIR expands its production of risk maps to a global reach, more regions can benefit. OpenIR's Flood Risk Map will function as a resource for goverments, universities and NGOs, but the web map format will also allow individual citizens to receive crucial information. Maps are a powerful way for all kinds of groups to protect their land and ecosystems. With this in mind, OpenIR can ultimately help developed and under-developed economic regions, as well as ecologically vulnerable regions, to save millions of dollars.

http://openir.media.mit.edu



Facts & Figures

Setting: OpenIR is set up on an MIT Media Lab 300 GB virtual machine, www.openir.media.mit.edu
Initial component: Geo-server system, which feeds visible and infrared spectrum data into web map layers
Data use for algorithm: Surface_reflectance, radiance, toa, mcd43a4, USGS, SRTM product lines et al.
Requirements: Updated web browser, with Javascript activated

Category
Information & Communication Technology

Pee Poo – Single-use Toilet

The Solution
Peepoo is a personal, single-use toilet which sanitizes human excreta shortly after defecation, thereby preventing faeces from contaminating and spreading lethal diseases such as cholera and diarrhoea. After use, urea inside Peepoo inactivates harmful pathogens in the faeces within 2-4 weeks. It is designed in the form of a slim elongated outer bag with a wider inner funnel that expands the opening while using it. After use, Peepoo is sealed with a knot that makes it completely airtight. It works as a micro-treatment plant: With the help of the enzyme urease present in human faeces, the urea in Peepoo breaks down to carbon dioxide and ammonia. Each Peepoo can contain up to 800 ml of faeces and urine. To facilitate usage, Peepoo can be fitted on any standard 1-3 liter container/bucket or the specially designed Peepoo seat/holder for sitting or squatting, called Peepoo Kiti. Peepoo remains odor-free for at least 12 hours after use and can be stored in the immediate environment.

Background Information
The number of slum dwellers continues to grow. Fed by an accelerating pace of urbanisation, 863 million people are now estimated to be living in slums compared to 760 million in 2000 according to statistics by UN Habitat 2012. In Asia and the Pacific, two out of five urban dwellers live in slums, compared with three out of five in Africa. In percentage terms, sub-Saharan Africa has about 72% of city dwellers living in slums. Among a range of other problems, these slums are largely lacking sanitation which has a major impact on the health and lives of people living in these hazardous environments.

Social Impact
Peepoo is easy to use at home, which increases health and safety especially for woman and children. This makes Peepoo a relevant solution for urban slums, schools, emergencies and refugee-camps. Peepoos can be collected in a specially developed collection system or utilized as fertilizer in household gardens after storing them for four weeks. Peepoo offers a variety of opportunities for small local businesses. Women micro-entrepreneurs and small kiosk retail outlets are the most important sales channels in urban slums. The women sell Peepoos door-to-door, or at plot parties which are organized like Tupperware parties. When the volume increases, local businesses can also develop from the collection and the processing of used Peepoos into commercial fertilizer. Currently, the collection and processing is performed by Peepoople with the aim of demonstrating viable business models that later can be franchized.

www.peepoople.com

Facts & Figures

Constituents: Aliphatic/aromatic co-polyesters (Ecoflex) and polylactic acid (PLA), with small additives of wax and lime
Initial substance: Urea (white crystalline substance with the chemical formula (NH2)2CO, which contains 46% nitrogen)
Dimensions: 146x380 mm with a thickness of 20 microns
Weight: 11 grams, of which 6 grams is the weight of the urea powder
Capacity: Up to 800 ml of faeces and urine

Used by Countries
Asia: Bangladesh, India, Pakistan
Africa: Kenya, South Africa
North America: Haiti

Category
Healthcare

Permafunnel: Internal Funnel for Hand Pumps

The Solution
Permafunnel is an internal funnel, which is easily installed in hand pumps in order to provide a straight water flow. It is machined from the food grade plastic UHMWPE (ultra-high-molecular-weight polyethylene) and is fully inserted into the spout of a hand pump. The outer diameter is selected to ensure a slight interference which fits with the inside of the spout and can be installed by using a hammer or alternatively, a hydraulic press. The inner diameter is designed to prevent restriction of the water flow at the highest possible pump rates. The funnel is cut at a 45 degree angle to enable it to be fitted deep inside the outlet spout. The upper part is specifically shaped to calm and guide the water flow. The correct size is selected to match the particular pump spout diameter and the installation is quick and simple. It can be fitted following the manufacture and prior to installation or also, into previously assembled hand pumps. It is not limited to a certain hand pump model.

Background Information
Without a funnel, the chaotic water flow exiting from hand pumps results in water waste of 30% or more. Hand pumps provide access to drinking water for many millions of people in rural and developing areas. When water is pumped into containers with narrow openings (jerry cans etc.) a large percentage is spilled due to the uncontrolled water flow exiting the pump spout. This waste contributes to unsanitary water points; longer pumping times and hence queues. Sometimes external funnels are made from organic materials such as leaves, but they are usually not handled properly and fall into the muddy area around the pump, contributing to the contamination of water.

Social Impact
In regions where clean drinking water is a precious commodity, it is imperative to have easy-to-handle systems that can stem the chaotic flow of water. This leads to less water being wasted and the population being able to save time and money on procuring water for their needs. Additionally, an invisible funnel system will not be touched by users, further reducing the rate of infection. Geographically, the funnel can have a huge impact in all areas where hand pumps are a primary source of clean drinking water. Small local companies could produce the funnel in order to retrofit previously installed hand pumps. Thus, jobs could be created by production and retrofitting.

www.nilecat.org

Facts & Figures

Material: UHMWPE
Diameter: Variety of external diameters to match the sizes found on installed hand pumps
Tools required: Hammer or hydraulic press

Used by Countries
Africa: Sudan

Category
Water & Waste Water

ReMotion Knee

The Solution
ReMotion Knee is an affordable, polycentric prosthetic knee designed for amputees in developing countries. Using durable, polymer-based materials with proven polycentric mechanism, instead of the typical steel or titanium, the ReMotion Knee is designed to improve usability and manufacturability. It has simple, universal attachments to interface with standard prosthetic leg systems, is made up of five components and four standard fasteners and weighs less than 0.5kg – one of the lightest knees on the market. The knee's 165-degree range of motion makes movements possible that are relevant to local cultures. Its lifespan has shown to exceed 3-5 years (3 million gait cycles), which is consistent with the benchmark set by prosthetics available on Western markets.The solution also addresses sensitive user issues, such as smooth and quiet operation, critical quality and bandwidth problems with local manufacturing through injection molding for mass production.

Background Information
In contrast to industrial countries, where health systems offer care for amputees, the existence of those living in developing and threshold countries is often threatened by their handicap. If the amputee is also the breadwinner of the family, their survival is frequently put at risk. For children the handicap means not being able to go to school. Therefore the value of high-tech prosthesis is priceless. Prosthetic knee joints are the most expensive component in a prosthetic leg system. Too often, the cheapest and most common designs, such as single-axis knee joints (acts similarly to a door hinge), are mechanically unstable and many amputees wear them in a locked (peg-leg) position. Polycentric and hydraulic mechanical joints have better performing gaits, but are very expensive with costs ranging from 1,400 to 50,000 USD. Left with limited options, many amputees resort to improvised prosthetics made from wood and metal scraps, donations of previously-worn components, or they use makeshift wooden staffs or crutches.

Social Impact
The ReMotion Knee has remobilized over 5,000 amputees in twelve countries, allowing them to start or to return to their jobs or to school. Unlike other prosthetic knees, ReMotion is optimized for the environment (agricultural and outdoor exposure), physical activities (kneeling and squatting), and it is adjusted to the price requirements of low-resource users. Extensive testing, including fatigue, long-term wear, ultimate strength, and kinematic gait analysis, has proven the robustness of the ReMotion Knee joint and its ability to withstand heavy usage in rugged environments. Above-knee amputees fitted with the knee can now hold jobs that used to be too physically demanding, such as standing for hours, peddling, or walking long distances. This means that amputees can return to work or school and will be able to lead independent, productive lives.

www.d-rev.org

Facts & Figures

Number of amputees fit: 5,000+
Material: Polymer-based materials with proven polycentric mechanism, composed of five components and four standard fasteners
Weight: Less than 0.5kg.
Lifecycle: At least 3–5 years (3 million gait cycles)
Characteristics: 165-degree range of motion, universal attachments interface with standard prosthetic leg systems
Required conditions: Trained level 3 prosthetist, clinic that is able to appropriately fit patients and provide necessary standard follow-up care

Used by Countries
Asia: India, Indonesia, Iraq, Pakistan, Sri Lanka
Africa: Liberia, Tanzania, Uganda
South America: Colombia, Ecuador, Guatemala
Oceania: Fiji

Category
Healthcare

River Ice – Cooling System

The Solution
River Ice is a small-scale Garman river turbine directly connected to an open refrigeration compressor. Polyethylene bags which contain filtered water produce ice blocks through the energy of the currant. Garman river turbines (or the very similar Tyson- and VHL-turbines) are well known technologies. Their typical power output is 300-500 W and they are mainly used for house lightning, cellphone recharging, etc. In contrast to the conventional turbines, the River Ice turbine is connected directly to a mechanical compressor, which cools down through polyethylene bags containing water, thus producing ice blocks. For this system to work, a river must have a minimum depth of 1.7m and a flow rate of at least 0.6 m/sec. If the energy flow of a river surpasses 12 kWh/day, it is sufficient to produce more than 250kg/24h of ice in tropical areas with temperatures of 30°C or higher. According to Aprotec, the River Ice plant allows a direct cost saving of about 66%, compared to usual ice production methods.

Background Information
According to WHO estimations, a great deal of food is spoiled due to inadequate storage options in developing countries. This amount rises in tropical regions. Particularly affected is fresh fish as an estimated 40% of the stock rots before it can be processed. Cooling devices are not available and the hygiene is insufficient. Many rural communities in proximity to rivers e.g. the Amazon River, the Orinoco River, the Zambezi, Congo and the Nile, live on fishing and fish trade without the possibility of maintaining stocks. In these regions cooling is often as important as electricity.

Social Impact
River Ice is a cooling system which operates around the year, independent of the supply of conventional fuels. It will improve the livelihood of villagers living near to tropical rivers.The social impact is especially high with regard to the improvement of local living conditions and a better commercial exploitation of local fishing. The possibility of keeping their fish cooled, will lead to greater job potential in the communities. Job creation can also be expected from distribution, installation and maintenance of the River Ice plants. Moreover, water current turbines are a reliable and ecologically friendly technology. Overall, the River Ice plant could pave the way for other technologies: The system could be supplemented by a small PV-driven ultrafiltration plant and as a result produce absolutely clean and germ-free water for the ice blocks from the river water.

www.aprotec.com.co

Facts & Figures

Component: Garman river turbines (Typical power output: 300-500W)
Conditions of floating mechanism: Rivers with minimum depth of 1.7m and a flow rate of at least 0.6m/sec
Energy production: 12 kWh/day (sufficient to produce more than 250kg/24h of ice in tropical areas with temperatures of 30°C or higher)

Used by Countries
South America: Colombia

Category
Water & Waste Water
Energy
Healthcare

ROTOR – Swimming Power Plant

The Solution
Rotor is a small, hydro power plant, which provides an easy way to generate electricity by using the current of a river. A vertical axis water wheel is mounted in the center of a circular tube. Induced by the flow of a river, the wheel turns like a turbine. The rotational energy is transferred by the axis to a wheel where several conventional bicycle dynamos – in the advanced version a specially designed generator – transform the kinetic energy into electricity. The rotor is fixed to the embankment, a bridge or something similar by mooring ropes. The prototype rotor consists of a tractor tire tube, flat bar steel as frame construction, bicycle dynamos and blades made of sheet. All of the used materials are substitutable and are therefore available worldwide for little money. A flow speed of 1.5m/s can provide an output of up to 150W. An online-Do-It-Yourself manual will be created, which offers a variety of possible materials to be used. Moreover, an affordable pre-fabricated construction kit which includes the important parts, i.e. tire tube, blade profiles, canvas cover and a specific generator is being developed. The objective is to provide a stable power output of approximately 100W.

Background Information
According to figures published by the International Energy Agency (IEA), 1.4 billion people do not have access to electrical energy. Over 2.5 billion people rely on traditional biomass for cooking. Access to electrical power plays a significant role in improving living conditions. Among other things, it can be used for the cold storage of food, for the use of electric pumps to gain access to drinking water and also, to provide lighting in households. In accordance with the Millennium Goals, it is important to use ecologically sustainable technology to enable access to electricity.

Social Impact
The Rotor uses low-cost technology and can be constructed in an easy manner. Required materials are substitutable and available worldwide. A special focus is put on recycling materials. In many regions local generation is the only possible way to get access to power. For families in rural areas with rivers nearby the Rotor means the availability of renewable energy with a permanent output (day and night). It can be used for lighting, cooling or charging batteries and mobile phones. In comparison to small PV cells and wind turbines the stream turbine has the advantage of producing energy 24/7 without the need of expensive battery storage. The distribution of a self-built Rotor or a pre-fabricated construction kit could also offer opportunities for local businesses and create jobs.

www.heinsdorff.de

Facts & Figures

Material: Tractor tire tube, flat bar steel as frame construction, bicycle dynamos, blades made of sheet
Electric capacity: 150 W for the prototype dimensions at a flow speed of 1.5 m/s (with an appropriate generator)

Used by Countries
Europe: Germany

Category
Water & Waste Water
Energy

Score Stove™ 2

The Solution
The Score Stove™ 2 is a low-smoke cook stove with high combustion efficiency. When cooking with wood fuel or other fuels such as dung or crop residuals, it produces additional electrical energy through the combustion heat. Using the electro-acoustic effect with the help of an innovative device, powerful sound waves are produced in combination with a linear electrical generator. The sound emmitted by the stove is no louder than a hum. The electricity produced by the Score Stove can be used to charge 12 V batteries or to provide main AC voltage. The stove is designed to be used in developing countries and can bring electricity to people in rural or remote areas. The Score Stove uses 30 to 50% less wood than the conventional 3 stone stove, thus, reducing deforestation. Working prototypes of Score Stove™ 2 exist in the UK, Malaysia, Bangladesh and Nepal. Trials have proven that the device can produce enough electricity to light two LEDs whilst cooking a meal, for example, eggs and rice.

Background Information
2.7 billion people still depend on firewood, charcoal, dung and crop residues for their daily cooking and heating. The health risks of the traditional cooking practices should not be underestimated: Rudimentary wood-fired cook stoves and open fires emit fine particles, carbon monoxide, and other pollutants at levels up to 100 times higher than the recommended limits set by the World Health Organisation (WHO, 2011). Chronic exposure to smoke from traditional cooking practices is one of the biggest, albeit least known, death causes. Every year nearly 2 million people die prematurely from illnesses, which are caused by indoor air pollution from inefficient solid fuel use in the households. Nearly 50% of pneumonia-related deaths amongst children under the age of five are due to particulate matter inhaled from indoor air pollution (WHO, 2011).

Social Impact
The Score Stove™ 2 may help to provide small-scale electricity generation to areas where supply is limited. As the stove traps the heat and smoke which are produced by the fire, it reduces the amount of smoke that escapes into the air and therefore minimizes negative health effects for the families. It also has a positive environmental effect, as the stove consumes much less wood than a normal 3 stone fire stove, thanks to its energy-saving design. The Score Stove™ 2 will be adapted for the use of liquid paraffin as many rural communities in Africa are still highly dependent on it. The electricity produced by the Score Stove™ 2 can be used to charge 12 V batteries or to provide main AC voltage. A mere 20 watts of electricity can revolutionize lives in rural households in developing countries, by providing access to lighting, radios and cell phones.

www.score.uk.com

Facts & Figures

Generation:
23 watts of electricity using wood as the fuel
37 watts under laboratory conditions
Energy efficiency: 30 to 50% less fuel than a conventional 3 stone stove

Used by Countries
Asia: Bangladesh, Malaysia, Nepal
Europe: United Kingdom

Category
Energy
Food & Agriculture
Healthcare

SimGas GesiShamba rural biogas digester

The Solution
SimGas BV from the Netherlands has developed a system which circumvents the main problems arising for conventional biogas solutions. The GesiShamba ("Farm-Gas") presents an affordable high-quality fixed dome biogas system designed for livestock holders in (sub-)tropical areas. It is mass-produced in recycled HDPE (high density polyethylen) which reduces material costs, while accelerating the transport and installation process. The biogas system uses manure and organic waste to produce gas for cooking and the effluent is used as a valuable fertilizer to nourish crops. The GesiShamba was constructed as an all-rounder, which means that it can also be used for co-digestion of (non-lignin) biodegradable materials, further improving the gas yield. The systems are economical, transportable, modular expandable and easy to install – qualities which current biogas systems do not possess.

Background Information
Playing a key role in African agriculture, smallholder farming accounts for about 75% of agricultural production and over 75% of employment. Smallholders who keep livestock often do not have access to technologies and energy. With deforestation being one of the major environmental issues in Africa, it is a great challenge to find sources of fuel which meet household energy requirements. Cooking on wood and charcoal creates indoor air pollution being one of the major causes of death and disease. Biogas technology, which converts biological waste from livestock into energy, is considered to be the most suitable tool for the supply of energy in these areas. As a clean power source, Biogas meets household fuel needs, reduces energy expenses and improves soil conditions, household sanitation, as well as, indoor air quality. However, installation of traditional biogas equipment is expensive, time-consuming and often difficult to handle.

Social Impact
The GesiShamba systems, which have been available in Tanzania since mid-2012, were specifically designed to fulfil the needs of smallholders with livestock. Biogas meets household energy needs and reduces energy expenses. It simultaneously also improves soil conditions, household sanitation and indoor air quality. The replacement of solid cooking fuels by biogas results in a carbon emission reduction of at least 6-8 tonnes CO_2-eq per year per system (depending on the size of the household) and makes a significant contribution to the reduction of deforestation. Typically, livestock holders in East Africa have a range of 1-10 cattle. These households can benefit from the installation of a household biogas system (2m³-15m³) and earn back their investment within 18 months. Due to a healthier living environment, a household can also reduce health care expenses. The organic fertilizer which is created as a by-product of biogas production additionally increases crop yields of farmers.

www.simgas.nl

Facts & Figures

Material: post-consumer HDPE(high density polyethylene) regrind) and out of injection-moulded components and extruded seals.
Lifecycle: At least 20 years.
Local requirements: The household needs to have sufficient space for the digester and has to be able to collect the manure of 1-2 cattle, preferably zero-grazing (dairy) cows.

Used by Countries
Africa: Kenya, Tanzania

Category
Energy
Food & Agriculture
Waste Management & Recycling

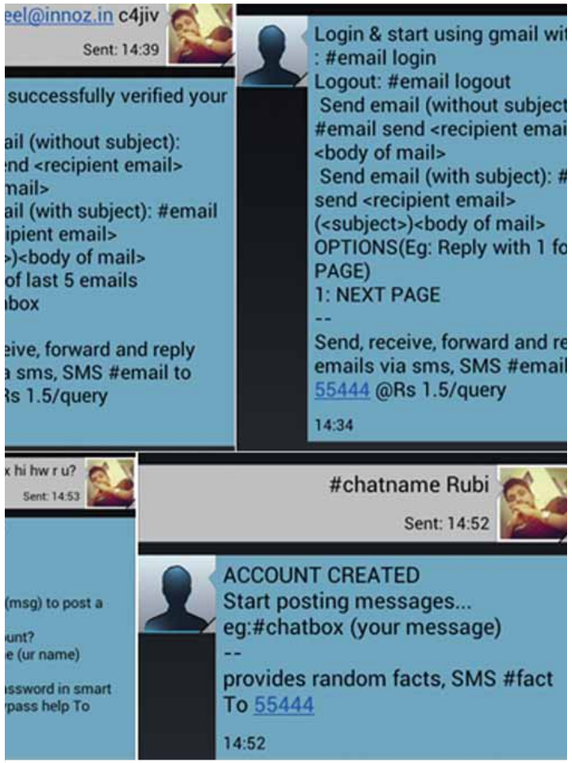
SMSGYAN – Information & Communication

The Solution
The solution titled SMSGYAN (Gyan meaning "knowledge" in Hindi) acts as a bridge for digital divides by providing Internet to the offline world. SMSGYAN provides information services, such as access to a dictionary, an encyclopaedia, job search, health information, stock markets etc., via text messages. For the user, it is a simple and cheap way to search the Internet via text. The mobile user types an SMS with the query and sends it to 55444. Once the Gyan engine receives a query from a mobile user, the algorithm spiders the World Wide Web or Wikis on the Web for related information, zeroes in on the most relevant inputs and shortens it to be sent back to the mobile phone via the text message route. SMSGYAN currently works only in India, but will be transferred to other developing countries. The services are offered on a revenue sharing basis with the operator (0.01 Euros per SMS or 0.30 Euros flat rate per month).

Background Information
The majority of the population in developing countries such as India still do not have access to the Internet although there is widespread use of mobile phones. As one of the United Nations Millennium Development Goal targets, the World Summit of the Information Society committed to connect villages with ICTs by 2015. With improved access, people will be able to aquire a wide range of beneficial information that can help them to learn about opportunities and to improve their daily life.

Social Impact
SMSGYAN provides Internet-based services to people who have a cell phone but no Internet access. It is a new, simple, end-user friendly way to search the Internet via SMS. It can be used to get a wide range of information, from crop prices or educational information, all the way to vital health information. The price for the end-user is affordable.

www.innoz.in
http://55444.in



Facts & Figures

Technology: SMS as frontend for web search. A specially developed gateway (Gyan engine) interprets the SMS query, extracts and compacts search results.
Characteristic: The internet search returns a max. 500 characters result to the inquirer. Q&A and keyword formats including What, Why, Where, Who etc. which enables queries are supported
Required device on user-side: Mobile phone

Used by Countries
Asia: India

Category
Information & Communication Technology

SOLARKIOSK

The Solution
The SOLARKIOSK is a solar-powered autonomous business hub. It utilizes solar power to provide rural off-grid communities with sustainable energy and energy-related products and services such as battery charging, communication, refrigeration, and an unprecedented access to technology and information. A SOLARKIOSK uses the energy it produces as a "mini smart grid". The structure is a modular and expandable kit-of-parts that can be easily transported and deployed in remote off-grid areas. Globally, 1.5 million people live without electricity access – 800 million of them are in Africa. Their annual energy expenditures amount to approx. 30 billion USD – about 120 USD per household. The majority of their energy is provided by unsustainable and dirty fuels despite abundant sunshine. The SOLARKIOSK addresses energy needs and spurs sustainable economic development of rural off-grid communities worldwide. As inclusive business model on a franchise basis, the SOLARKIOSK works at the bottom-of-the-pyramid and enables local kiosk owners to meet the needs and challenges of their rural off-grid communities.

Background Information
One in five people worldwide live without access to electricity, which is one of the biggest driving forces in economic and social development in the poorest countries around the globe. Mobile phones for example are often the only connection, providing crucial access to information or finance in rural areas. However, these also need electricity and access to it usually forces people to travel long distances. UN Secretary General Ban Ki-Moon homed in on this point in his speech at the World Energy Summit in 2012: "Widespread energy poverty still condemns millions to darkness, to ill health, to missed opportunities for education."

Social Impact
A powerful and sustainable energy supply unit in off-grid areas allows many people the use of small electrical appliances, meets people's needs and opens up various business opportunities. Solarkiosks are already operational in Ethiopia and have proven that there is a sustainable and profitable market for the solution and its inclusive business model. Experience in the past years has shown that, contrary to popular belief, rural communities do have purchasing power, also for more expensive items.

www.solarkiosk.eu

Facts & Figures

Components: Aluminum frame; PV system with at least 1 kWp PV; fully integrated and secured electricity and power board (inverter, charge controller, remote control monitoring, battery system); Optional, fully integrated appliances: Solar fridge, multiple mobile phone, battery and solar lantern charging board, computer, internet, printer, scanner, television, water filtration devices, battery cabinet for 24/7 use

Used by Countries
Africa: Ethiopia, Kenya

Category
Energy
Housing & Construction
Information & Communication Technology

Solar reflectors

The Solution
The solar reflectors can be used to bake, cook, or fry all kinds of food, as well as to generate steam. They are based on the Scheffler type, as they are built of steel sections presenting 16 m² of highly reflective aluminum. Powered by a sensor-controlled motor, the reflector rotates, following the course of the sun and focusing its light on the one point throughout the year. This focus collects the sunlight and therefore reaches temperatures, which exceed 1000 °C. Depending on the seasons, the reflector is configured to the angle of the sun at two levers very simply by hand. The system is transportable.The concentrated energy can be used for heating a plate of about 1 m² or an oven to 180-250 °C in about an hour. The temperature is kept constant by an integrated stone core. Further, it can be used to generate steam as an energy source, as several combined reflectors can vaporize water in an absorber that is connected to a pressure tank (to max 10 bars).

Background Information
Small and medium sized enterprises are on the look-out for potential energy savings and alternative power sources as they are fighting for survival in the face of exploding energy costs. Especially in Mexico, where fossil fuels had been heavily subsidized for a long time, prices have been subjected to a gradual increase intended to bring them onto the international level.

Social Impact
The design of a Scheffler reflector overcomes the problems of sun tracking and focus point adjustment. For small restaurants, bakeries, tortillerias and dairies, this kind of affordable energy could be the chance for survival and offering job opportunities – given that energy costs keep rising. Even the concentrated sunlight from one single reflector can be used for cooking and baking. There is no need to change the infrastructure: Anyone who uses a conventional stove can immediately do so with the solar reflector, because the concentrated heat is provided from below, in contrast to a conventional gas or wood stove. Only the power supply changes, the method of cooking itself remains unchanged. The plate in the kitchen can take normal pots and pans of steel or earthenware.

www.trinysol.com

Facts & Figures

Material per Reflector: 16 m² of highly reflective aluminium, a sensor controlled motor for rotation (powered by a small PV island system)
Energy generation/Temperature: Temperatures in excess of 1000 °C (reflector focus concentrates the sunlight by a factor of 800)
Conditions: The solar reflectors can be used in regions with high solar radiation.

Used by Countries
North America: Mexico

Category
Energy
Food & Agriculture

SunSaluter

The Solution
The SunSaluter is a dual-incentive passive solar tracking and water filtration system, which optimizes existing solar infrastructure by collecting up to 40% more energy and simultaneously providing clean drinking water. Solar tracking is achieved through balancing the weight on both ends of the solar panel. Controlled water flow adapts the balance of the solar panel, which is secured on a bamboo frame with a rotatable axis, to the direction of the solar radiation. The system is suitable for areas with near zenith angles of the sun, such as tropical and subtropical regions. The SunSaluter does not require electricity and can be manufactured from local materials for less than 40 USD. As an add-on to the system, a filter unit constructed from either silver-coated ceramic or bio-sand is placed below the water container. Both ceramic and biosand filters trap up to 99.9% of contaminants and micro-organisms in the filter pore (according to entrants). Filter units can be locally procured for less than 10 USD.

Background Information
Access to clean drinking water and electricity are important cornerstones in basic supply. Converting solar energy to electricity offers many benefits in terms of efficiency and sustainability, especially in areas with much sunlight and poor infrastructure regarding central power supply. One major deficiency of the panels currently in use is that they are installed statically and cannot follow the course of the sun. Although electric motors exist which can rotate the panels towards the sunlight, they require electricity, a high degree of maintenance and are expensive to install.

Social Impact
The SunSaluter aids impoverished communities in meeting their needs for both electricity and clean water. With this invention, a family can increase its access to electrity, as well as, to clean drinking water. The SunSaluter is primarily suitable for small PV systems, generating electricity to charge phones, lighting or operating a small TV. This invention can replace other energy sources which can either be damaging, such as kerosene or filling lamps, or require long distances to be procured.

www.sunsaluter.com

Facts & Figures

Material: Aluminium, bamboo, silver-coated ceramic or biosand
Areas of use: Tropical and subtropical regions

Used by Countries
Asia: India
Africa: Kenya, Tanzania, Uganda
North America: Mexico

Category
Water & Waste Water
Energy

Perspectives of Siemens Stiftung

Best practice solutions and new partnerships for sustainable development

Siemens Stiftung empowers people to lead independent and dignified lives. Our aim is to eliminate deficits in basic services and strengthen social structures. A main concern is to maximize community impact – that is, to empower a community to take on ownership, enhance capacity, and secure dignity.

In the field of Basic Needs & Social Entrepreneurship, Siemens Stiftung initiates projects in the areas of water, energy and environment to drive the development of self-sustainable ventures for basic supply. The focus lies on simple technical solutions, training, and entrepreneurship. Here, social entrepreneurs providing basic services in developing and emerging countries play an important role as they empower people to become actively involved in their own economic and social environment.

What we do:

- To effectively improve decentralized basic supply, Siemens Stiftung works with customized, low-maintenance technologies and transfers promising innovations to meet communities' needs.
- We encourage the use of appropriate technical solutions that provide a basis for locally owned businesses and job opportunities.
- We support the implementation of technical solutions only in combination with education and training as a crucial leverage for local ownership and empowerment. These training programs teach entrepreneurial, technical, and life skills.
- To help adapt established approaches to local conditions, we support local initiatives with the aim of financial independence as well as networks and interregional sharing of social entrepreneurial experience.

How we work:

Siemens Stiftung regularly screens promising approaches that tackle deficits in basic supply, and combine technical and entrepreneurial solutions. To make relevant inventions and available solutions transparent, we have launched the "empowering people. Award." Shortlisted candidates and other best-practice examples are to be made available on a database for development practitioners, investors, and other interested groups. Part of the foundation's networking activities is to initiate new partnerships as well as to promote knowledge across regions and sectors, technology transfer and entrepreneurial thinking for social development. Siemens Stiftung also supports selected ventures as model projects for scalable solutions for basic supply and income generation. Here, too, efforts to achieve financial sustainability go hand in hand with customized technical solutions and training programs. Together with partners, we support early-stage ventures to accelerate existing approaches and help develop new and promising solutions for self-sustainability.

Empowering people is the core of all our activities. Together with partners, we consequently pursue the screening, implementation, and strengthening of self-sustainable ventures to contribute to a better quality of life and to achieve scalable approaches in the long run.

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