Muhammad Yunus Innovation Challenge to Alleviate Poverty

With the generous support of MIT alum Mr. Mohammed Jameel, and named in honor of Nobel Peace Prize winner Muhammad Yunus, we are pleased to announce the second annual Yunus Innovation Challenge. The objective of the challenge is to harness the energy and inventiveness of MIT students to help solve the problems faced by some of the poorest communities around the world. Every year the Yunus Challenge will focus on a particular problem faced by specific communities. The problem will be chosen with input from groups and individuals working with poor communities around the world. Students will be provided with background information on the issue, as well as chances to visit, learn from, and work with relevant communities as they work to develop solutions.

The 2007-2008 Yunus Challenge topic is:

"Improving indoor air quality to break the cycle of poverty."

Indoor air quality is a concern around the world and affects predominantly the poor in their homes and workplaces. Exposure is strongly tied with burning solid fuels, a practice common to 3 billion people worldwide, half of whom are in India and China. In many African countries, over 90% of the population uses solid fuel. Worldwide deaths attributed to air pollution are on a level with those caused by malaria and tuberculosis. Indoor air pollution is not indiscriminate; the devastating effects are most strongly felt by women and children. For children under 5, for example, acute lower respiratory infections are the leading cause of death worldwide. Over half of those infections are related to indoor air pollution.

For this year's Yunus Challenge, we will focus on improving indoor air quality to break the cycle of poverty. Indoor air pollution kills 1.6 million people per year, yet efforts to prevent, monitor, improve the situation remain seriously understudied relative to other global health issues on a comparable level. There is ample opportunity for innovation in public awareness, technical interventions, monitoring programs, and more, to reach the estimated 3 billion poor worldwide who are affected by pollutant levels often 100 times greater than the recommended thresholds.

Potential Issues to Consider

The issues surrounding indoor air quality are fairly complex, and present a variety of opportunities for innovation, including:

- The strong cultural and social foundations for fuel practices
- The lack of availability and higher cost of cleaner fuels
- Understanding of the connection between health issues and personal practices
- Low quantity and availability of data to analyze or publicize the problem, or to measure the effectiveness of intervention
Criteria for This Year’s Challenge

The Yunus Challenge IDEAS Awards for 2007-2008 will be given to two teams who solve as many as possible of the problems that sustain the high levels of indoor air pollution experienced by those living in poverty, for the smallest cost possible. The issues considered may include, but should not necessarily be limited to, those listed above. The system may involve a physical device, but that is not required. In judging between proposals, credit will be given for innovation, feasibility, acceptability within the community (i.e. likelihood of adoption), and supporting rationale for how the solution addresses the issues faced.

Because the challenge is to improve indoor air quality for the world’s poorest populations, and the worldwide impact is so poorly known and studied, systems should aim for a price point that makes intervention accessible to the target community and dissemination or study possible at a large-scale. Cost will be an important criteria in judging.

The system should be designed to operate in conditions prevalent in households and communities in poor countries where indoor air pollution is a common risk factor against good health. Participants are encouraged to work on a design with a specific community or region in mind as this can be helpful in identifying constraints and providing context.

Supporting Initiatives for Potential Contestants

Opportunities will be provided to groups of students wanting to learn more about the challenge and the context in which any solution must operate. These will be provided through D-Lab class visits and individual fellowships through the Public Service Center. Students with D-Lab will encounter indoor air pollution, especially from indoor cooking, in sites ranging from India to Brazil. In India, students may have an opportunity to visit a non-governmental organization that includes improved stoves in its technology portfolio.

In addition, students are encouraged to apply for Fellowships which provide students working on a potential solution to visit and work with communities to develop a feasible solution which takes local context into account. These opportunities are again made possible through the generous support of MIT alumnus, Mr. Mohammed Jameel. Teams may also enter their proposals into the IDEAS Competition, where two special awards have been created to provide the winning teams with funding to pursue their ideas.

Contact Information

For further information, please contact Alison Hynd (hynd@mit.edu).
Background and Preliminary Readings on Indoor Air Pollution

The Global Burden of Indoor Air Pollution

Indoor air pollution is one of the greatest health threats in the developing world, claiming 1.6 million lives each year in addition to contributing to 2.7% of the world's global disease burden. Like tuberculosis and malaria, indoor air pollution is considered an affliction of the poor: 80% of world exposure to particulate pollution occurs inside in developing countries. The majority of the afflicted are women and young children, and they are disproportionately poor. The burden includes approximately 1 million deaths by acute lower respiratory infection in children, and a high incidence of lung cancer and chronic obstructive pulmonary disease in women. These deaths and illnesses are preventable.

Preliminary Readings:


- WHO Air Quality Guidelines http://whqlibdoc.who.int/hq/2006/WHO_SDE_PHE_OEH_06.02_eng.pdf


Organizations:

- World Health Organization Indoor Air Pollution program page: http://www.who.int/indoorair/en/


- Boiling Point, household energy journal: http://practicalaction.org/?id=boiling_point

- The Household Energy and Health project at U.C. Berkeley, and professor Kirk R. Smith, who researches indoor air pollution
http://ehs.sph.berkeley.edu/krsmith/page.asp?id=1
- Practical Action organization
http://practicalaction.org/?id=smoke_index

Videos:
- Journalist Adam Hart-Davis reports on smoke hoods in Kenya
http://www.green.tv/practical_action_smoke_hoods
- Breathing Space: a short video from the Shell Foundation
- Panel discussion, “Alleviating Indoor Air Pollution in Poor Rural Areas of China”

Technical Innovation

One way to address the issue is through innovations in technology. For solid fuel use in the kitchen, product development and case studies have focused on smokeless stoves and solar cooking. Although recognized as potential contributors to the global fight of respiratory illness, there is a lack of consensus on their effectiveness. Other factors limiting uptake may include difficulty in maintenance and low cultural acceptability, which may signify a need for more appropriate designs.

Preliminary Readings:

Children and Indoor Air Pollution

It may come as no surprise that afflictions tied to the solid fuels used for cooking affect women in poverty, who spend between three and seven hours per day at a household fire (WHO Fuel thing).
The impact on children is, if anything, even greater, and exacerbated by several factors. Young children spend most of their time with their mothers, even strapped to her body. As they are not fully developed, they have smaller airways susceptible to inflammation, breathe faster, and have weaker immune systems, relative to healthy adults. Children therefore absorb pollutants more readily than adults and also retain them in their system for longer.

**Preliminary Readings:**


**Low-cost Monitoring and Evaluation**

Conventional particulate sensors cost anywhere between $50 and $300 in the US. For a large-scale or long-term monitoring solution, particularly in the developing world, this cost is unacceptable. Innovations leading to low-cost monitoring and evaluation systems would make significant contributions towards understanding the details of where the greatest impacts are, the scale of the problem, and how effective technical or behavioral intervention programs are.

**Preliminary Readings:**

Obtaining, Disseminating, and Analyzing Data

Due to limitations in financial or organizational capacity, there is a worldwide paucity of large-scale data in indoor air pollution, particularly in the home. Roles to continue monitoring and disseminating data for better understanding are going unfulfilled or inadequately fulfilled. Even in areas where funds are available and programs are ongoing to monitor air pollution in public places (e.g. schools) or in large-scale studies including homes, getting the data into the hands of those who would use it for research or public intervention is still a challenge. This is an issue that exists in a variety of fields and in countries all over the world, but the lack of information is most keenly felt when health is at risk and budgets are limited.

Preliminary Readings:


