

Small is powerful



Two and a half billion people throughout the developing world have no access to modern sources of energy. Without them, they are doomed to stay trapped in poverty, with no hope of economic progress and very limited education and health care. And the fuels they can get – such as wood, dung and kerosene – damage both their health and the environment.

There is little hope that they will ever be reached by the modern electricity grids that people in rich countries – and the more prosperous areas of developing ones – take for granted. Even if they were reached, they could not afford to pay the high price of energy. But renewable sources are distributed free by nature.

These are normally best exploited on a small scale. Such ‘micropower’ lets people and communities meet their needs for heat and power with clean sources of energy. Often these are the sun and the wind, but they also include mini hydroelectric power, and making biogas from dung and other wastes. Typically they are sustainable and inexpensive to run and have little impact on the environment, while still providing reliable access to energy.

Increasingly – as the cost of energy rises, and worries about security of

supplies increase – people in rich countries are also installing their own micropower windmills and solar heaters and cells. But the greatest need is still in areas gripped by poverty, where, as it happens, renewable sources are also usually most abundant. Here are a few examples of successful micropower from literally thousands already working around the world.

Food on rooftops

Problem:

Fewer than 12 per cent of Mali’s people have reliable electricity. Without refrigeration, much food spoils.

Solution:

Mali enjoys 300 days of sunshine a year. Businessman Bamba Coulibally uses a solar dryer – an oblong frame that concentrates the heat of the sun – to preserve fruits, vegetables and meats, which he sells throughout Bamako, the capital city.

Benefits:

- Food is preserved using clean, free energy.
- The company provides much-needed employment.

Light from wind

Problem:

Some 4 million Egyptians in remote areas have no electricity, and rely on kerosene lamps for light.

Solution:

The Egyptian Solar Energy Society (ESES) designed and built two demonstration hybrid wind-turbine/solar-panel systems for a Bedouin settlement near Nuweiba, on the Gulf of Aqaba.

The complementary power sources (when it is not sunny it is often windy, and vice versa) provide a reliable electricity supply, generating enough for 10 households to each have a lamp, as well as to run a collective refrigerator and television.

Benefits:

- Refrigeration preserves fresh food and medicines, improving health and the quality of life.
- The project demonstrates how sun and wind can bring power to isolated areas.

Baking bread with rice

Problem:

More than 90 per cent of Sri Lanka’s bakeries use firewood to heat their ovens. Meanwhile, rice mills regularly dump mountains of paddy husks in public areas. They decompose and are eventually burned, polluting the air with carbon dioxide and ash.

Solution:

Several specially modified ovens – invented by a Sri Lankan baker – that burn rice paddy husks instead of wood were successfully installed in bakeries.

Benefits:

- Each oven saves a medium-sized tree per bakery per day.
- Paddy husks are free, so daily fuel costs dropped from \$4 to €28 per baker.
- The ash collected from the new ovens can be used as fertilizer.
- Emissions of the greenhouse gas methane, generated by decomposing husks, are prevented.
- When burned, the husks produce fewer carbon emissions than firewood.

UNEP/Topham



www.uneptie.org



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Cooking with sewage

Problem:

Sewage from the 1,200-pupil Santa María del Fiat school and orphanage, perched on a cliff overlooking the Pacific in Ecuador, flowed directly into the ocean.

Solution:

A biodigester now produces biogas for cooking, and the school's stoves have been modified to run on it. The system is supplemented by manure from local farms during school holidays.

Benefits:

- The school stoves now use 60 per cent less butane, reducing greenhouse gas emissions.
- Sewage no longer gets dumped into the Pacific.
- The students at the school have learned about alternative energy, and have begun educating the local community about biogas and the environment.



Guus Geurts/Still Pictures



PURE Energy Centre

Sun in the rainforest

Problem:

Caboclo Indians in the Amazon's Xixuaú-Xipariná Ecological Reserve wanted to replace kerosene, diesel and wood with a dependable, sustainable source of energy that would not damage the forest, their most valuable asset.

Solution:

The community installed solar panels that now power refrigerators for medicines, computers and lights for the local school, a pump to supply freshwater and a satellite dish that gives access to the Internet.

Benefits:

- Their new power supply is free, clean, healthy and reliable.
- The Internet enables them to get medical information and education, and opens up economic opportunities, such as promoting ecotourism and selling handicrafts.

Dung and water

Problem:

The people of the Kizil-Charba village, in northern Kyrgyzstan, have too little electricity, yet they rely on electric

heaters in the winter, when temperatures are around -6°C .

Solution:

Biogas digesters convert the plentiful supply of animal dung in this agricultural area into fuel for cooking, lighting and heating. But they don't work when cold, so the village built a 5-kilowatt microhydro system on the nearby Urmal River and attached it to four biogas units to keep them going in winter. In warmer weather, the hydroelectricity is used for lighting.

Benefits:

- Twenty-two families have a more reliable source of energy, and are less dependent on fossil fuels and wood.
- The units produce 15,000 cubic metres of fertilizer per year, saving farmers money on expensive chemical nutrients.
- Drinking water quality has improved because dung is not left to contaminate groundwater.

Bottling wind power

Problem:

The 700 people who live on the remote island of Unst, the northernmost of the Shetland Islands, spend an average of 18 to 20 per cent of their income on energy, mostly on heating and transportation. The community also needs jobs now that a Royal Air Force

radar station, which employed 114 people, has closed.

Solution:

Local engineering graduate Ross Gazey conceived of the PURE (Promoting Unst's Renewable Energy) system, a way to harness the area's powerful winds and abundance of rain to split hydrogen from water using wind-generated electricity (which is also used to heat and power buildings). Hydrogen can be stored and used to produce cheap, clean electricity for the community and to power zero-emission cars.

Benefits:

- The community-owned system, which is still expanding, now provides 2 per cent of Unst's power, helping the town to meet its own needs and lowering its dependence on expensive fossil fuels.
- The project has already provided much-needed local jobs.
- PURE's hydrogen-powered car demonstrates the feasibility of vehicles that run on emissions-free fuel.
- One of the obstacles to using hydrogen as an alternative fuel is that it takes a lot of energy to extract it from water. That's why PURE – the world's first off-grid, renewable hydrogen-generating plant – holds great potential for the future of the fuel, and could even grow into an important hydrogen-exporting industry, which would greatly benefit the community's economy.