NARRATOR
In Asia over a billion people have no access to electricity. Most of these are the rural poor living far from the nearest mains power supply. A lack of energy places tight limits on education and on livelihoods. These people like off the grid

So off-grid solutions are an ideal way to bring electricity to Asia’s poorest communities. In this week’s programme we look at promising new developments that get power to people in the farms and villages, we report on six thriving projects supported by development assistance agencies.

Diwali, the Hindu celebration of light over darkness.

In electrical terms this is a battle that continues across the land with India’s power industry struggling to meet ever-growing demand.

Supplying electricity to rural areas is often costly and inefficient. Now an innovative power plant has shown that locally produced electricity can power up the countryside and lighten the load on the environment.

Kolluru Krishan, Malavalli Power Plant
We generate jobs and we generate electricity locally through a renewable energy source.

NARRATOR
The privately owned Malavalli bio-mass plant in rural Kanataka makes money from rubbish by generating electricity for sugar cane waste and coconut fronds. India produces around 250 million tons of sugar cane a year and after harvesting the profitable stem, thirty million tons of waste is left to burn.

N Nannjegegowan
For any purpose it was not using that now it is very useful for us so we are getting money and we are getting power, quality power.

NARRATOR
Some four hundred workers supply the plant with the 140 tons of waste it needs every day. At the plant the waste is chopped to size and conveyed to the boiler for combustion. Higher density slower burning fuel like eucalyptus is added to create a more even burn.

The heat this generates makes steam which drives the turbine to generate electricity. This is sold back to the national grid and transmitted to a nearby substation for feeding to the community. Throughout the process waste and pollution are minimised. The carbon dioxide produced by a bio-mass plant is absorbed by the next crop of sugar cane making it carbon neutral.

The ash residue is useful too. High in alkaline it is composted at a nearby silo and turned into organic fertilizer. This is packed and shipped back to the farmers, a hundred kilograms in return for each metric ton of bio mass fuel supplied.

Access to reliable power and more of it has a dramatic effect on local industry including this rice mill.
Moqboal Ahmad, Siddiqui Rice Mill Ltd
Voltage used to be a problem. There used to be power losses and we used to get power for only six hours and we had to use the generator which cost double the money. It wasn't working out.

Now since we got the new power we are at peace. I had one rice mill before. Since getting a better power facility I've got three mills. People are getting jobs.

NARRATOR
A non-profit organisation, Gramina Abevrudi Mandali or GAM, is run like a local council.

Sub-contracted to the central state distribution utility, GAM trains locals in maintenance and monitoring of the power supply in forty-seven villages. Putting service centres closer to the customer has made paying cheaper and easier.

Chickthayanna
Before we used to spend twelve to fifteen rupees travelling to pay the bill and it used to take a whole day. Now my husband bikes to pay the bill and is home within an hour.

NARRATOR
If Malavalli’s success was replicated across India, it could mean a hundred billion extra kilowatt hours of electricity a year, enough for 200,000 rural villages with few environmental side effects.

Puroshotan Nayak, GAM
We want to see this GAM as well as Malavalli power plant as model of India.

NARRATOR
Winning this race in the Tibetan highlands would once have made you king for a year. This century the prize is solar power rather than political power, about enough of it to light your home and work a radio or television.

With 40,000 solar home systems already bought in this region and another million expected by 2007, the solar market is gathering pace.

The Chinese rural energy development project aims to help make using solar power an everyday event, a market race for consumers which also raises industry standards.

Sixty million people live here. The vast distances between them mean many don’t have access to the national electricity grid. Using solar power is an increasingly common choice.

The chance to watch television and listen to the radio are two strong incentives to go solar.

A small solar home system costs around sixty dollars and generates ten watts. With few credit schemes available, buying these is nearly always a cash transaction. Store keepers compete for business and with solar PV components making up to 30% of sales, here in the Gan Xiu province business is good and getting better.
A grant from the China Renewable Energy Development Project gives manufacturers $1.50 for every watt of solar power sold. From seventeen companies in 1996, there are now around thirty accredited companies making solar goods.

Like other household products, the solar home systems come with a guarantee from the shop owner to encourage purchase. That means quality standards have to be set in the manufacturing stage. Twenty-five factories make parts for or assemble solar home systems in China. Parts manufacturers check their components before shipping them to their assemblers and as the market expands, the standards rise. Export of solar home systems and solar panels is now a boom industry in China.

To meet demand, international standards are being adopted across the country. The prize for Asia’s largest single solar installation goes to Beijing’s national solar laboratory.

This panel produces enough electricity to power around twenty thousand televisions. Targeting the consumer has improved production standards and led to the wider application of solar products in China. It’s an increasingly competitive industry that’s keeping an eye on the prize: a growing market for clean cheap power.

Three quarters of Sri Lanka’s population live in rural areas. Almost half the country has no access to electricity. Decentralised alternatives, wind, solar and micro hydro schemes used to be restricted to pilot projects but now a new power structure backed by international finance and the World Bank is revolutionising access and proving that these alternatives are a cost-effective way to electrify rural communities.

**Jayantha Gunasaya, Intermediate Technology Development Group (ITDG)**

At the beginning no one believed that micro hydro can be used for rural electrification. We had a struggle to convince people, all people concerned and but now everybody knows that, micro hydro is one of the famous subjects in electrification.

**NARRATOR**

Using water for power is centuries old. Today people think of large scale dams for generating electricity but there is another way. Micro hydros don’t store water but use the river’s natural course to make power and minimise environmental impact.

Intermediate Technology Development Group, ITDG, saw that Sri Lanka has perfect conditions for micro hydro. They decided to work with communities to test its viability.

**Jayantha Gunasaya**

The simpleness of the technology that can be handled by the rural communities is a first reason why we have selected micro hydro.

**NARRATOR**

Katepola is one of the earliest micro hydro pilot sites developed by ITDG. Set up in 1995 with the help of the Jenna Savia trust fund and the villages themselves, it uses a simple technique to power 116 households. Water is diverted from a local stream and dropped into the penstock or pipe. The momentum creates pressure and mechanical energy drives the turbine and converts it into electricity. It’s then transmitted to village households.
Realising that technology without user support was doomed, ITDG and the villagers set up an Electrical Consumer Society to maintain the site and collect tariffs.

**Ramani Sriyam, Katepola Electrical Consumer Society**
The success of the project depends on the Electrical Consumer Society, the main responsibility is the treasurer’s as he deals with the money.

**Ruwan**
Once a month the treasurer of the Electricity Consumer Society comes to collect what I owe based on the rate of a hundred rupees a day for the days that I have used power for work purposes.

**NARRATOR**
The lower costs and higher rewards of bringing power to the people won them over to the scheme.

The pilot’s success in mobilising community finance and winning support convinced the World Bank to fund the energy services delivery project. This would set up fifty-six off-grid micro hydro power plants to bring electricity to 2,800 households across Sri Lanka.

Funds from the World Bank were channelled to Sri Lanka’s DFCC Bank. Money could then be drawn down by local commercial banks and institutions.

**Jayantha Gunasaya**
Each stakeholder has a specific role to play so that brings all together and the systems to work.

**NARRATOR**
Though more local training is needed, micro hydro is now seen as a realistic option for many more poor communities who otherwise would have no hope of access to electricity.

**Jayantha Gunasaya**
I originally did a feasibility study of the potential, to identify the potential of micro hydro in Sri Lanka. We have identified a thousand such sites total so that means more than eight hundred to go.

**NARRATOR**
Seventeen hours by boat from the bright lights of the Bangladeshi capital, Dacca, lies Char-Montez, one of a cluster of small islands off the southern tip of Bangladesh.

It’s four hours boat ride from the nearest electrical grid and will probably never have a conventional electricity supply.

The island has become the focus for a multi-funded renewable energy project that’s not only bringing light but training poorly educated women to become solar electrical engineers.

For rural women in Bangladesh daily life means domestic chores and collecting water but these thirty-five women on Char-Montez island are dab hands with power drills, pliers, and soldering irons.
Tauheed Ahmed Talukdan
My role is, the first role is to train them. The women working over here were trained by me and in other islands also I used to provide technical training, especially electronics and solar.

The women of this area, almost all of them are not educated but very often I found them resourceful. They have some talents inside.

NARRATOR
Tauheed is visiting a neighbouring island where another group of women is being trained.

Tauheed Ahmed Talukdan
I have got ten students here, all women. Today I'll teach them about the components which are used in solar home system.

They had no practical training earlier so these soldering irons are very much hot so they are afraid of this device to use. I think it will take another two months. I hope they will be trained completely.

They are saying that surely they will do it after learning the whole course.

NARRATOR
Back in Char-Montez, Tauheed's fully trained electrical engineers have formed a co-operative and are assembling delicate component parts for home solar lighting kits. The kits are selling well in the local market as well as in Dacca.

Their workshop is powered entirely by solar energy.

And there’s enough power from these roof top solar panels for them to expand their business by providing a much-needed battery re-charging service. In the past, people made a costly and time-consuming boat trip. Customers can also drop into the women's cooperative to buy a home solar lighting kit.

Once he’s agreed to buy, this customer is taken through the various payment options before handing over his deposit.

Zakir Matubbab
I have decided to purchase a home solar kit because it gives better light.

I don't like the kerosene lamp because it makes the house dirty but this solar lamp will make it easier for my children to study at night.

NARRATOR
Since the project started two years ago, the women have sold almost three hundred home solar kits to the five islands covered by the co-operative. Several businesses and households in Char-Montez now enjoy solar lighting. Runa Khan is a co-operative graduate by day and a seamstress by night. Naturally her home is powered by solar energy.
Runa Khan
Before we had the solar lamp, we couldn’t see at night but now I can use my sewing machine and the children can read and my house is safe because the kerosene lamps cause so many accidents. Also I can work all through the night which increases my income.

NARRATOR
Runa and her friend Shahida have recently returned from America. They had been invited to a trade fair to demonstrate their solar lamps and skills.

Shahida Gazi
Myself and my husband want our children to be better educated and they should go to university, visit America like I did and then they will have a better life and better home.

Tauheed Ahmed Talukdan
Their husbands, they were actually not in favour of this project but now they are supporting them, because now they understand their outlook, changed they understand that the women they should learn something, they should do something.

Christine Wailing, World Bank
Women’s empowerment is a very important thing in Bangladesh. Women are a neglected majority in the country and bringing economic opportunity to women is hugely important for Bangladesh’s future.

So women’s empowerment was very much at the heart of this and we’re really delighted that it has taken off so well.

NARRATOR
Thanks to these empowered women, the stored energy of the setting sun over Char – Montez island is lighting up the lives of a remote corner of Bangladesh

In Sri Lanka solar power is also taking off. Salavadaya Economic Enterprise Development Services, SEEDS, sprung from the Salvadaya Sharmadana movement, Sri Lanka’s largest non-government organisation.

Since 1986 SEEDS has used door to door banking to reach people who’d otherwise have no access to credit and from the beginning one of the most popular funding requests has been loans for solar homes systems.

Set up in 1997, Sri Lanka’s energy services delivery project noted the demand for solar home systems and made loans to conventional banks to try to stimulate the market for renewable energy, but many banks felt that the loans were too small to merit the administration and rural clients were unwilling or unable to travel to bank premises.

Then in 2001 SEEDS took over the job of handling the money. So how does it work?

A solar sales person visits possible customers and, if they’re all convinced, helps them fill out an application for a loan. On their next visit the sales person introduces the customer to a SEEDS field officer who assess their credit risk.
Sesira Kumara is to become one of 33,000 people granted a SEEDS loan. He'll find repayment costs are offset by money saved on kerosene and batteries. SEEDS charges ten percent interest compared to a commercial bank’s sixteen or so. Once the loan is approved installation is straightforward.

The solar home system is ready to work, generating a current from energy absorbed from sunlight. This can be used instantly or stored in the battery for night use.

Basic maintenance knowhow is passed onto the client but service doesn’t stop here. The team provides after-sales service for two years but with long-lasting parts they rarely have to visit.

The battery lasts for five years and panel for twenty.

**Shakila Wijewarderin, SEEDS**
So it's a win/win situation, cos if the companies provide good service, good marketing, it’s good for SEEDS and also to the community, same way that the market companies will benefit if you have a good loan products, service and so on.

**NARRATOR**
It really is win/win. The loan scheme minimises the risks of small scale lending, and satisfied customers help build solar power’s growing popularity.

**Shakila Wijewarderin**
It’s a very safe energy source. We know that in Sri Lanka there are so many accidental, accidents and deaths due to like unprotected kerosene lamps so all these things can be avoided by using the solar energy.

**Vox Pops**
We come here because it’s easy for us to study because there is light here. It helps my father’s industry and we can watch TV and we can read, and that’s good for our day to day life.

**NARRATOR**
As well as fuel savings, solar power helps meet SEEDS’ mandate of lifting poverty by generating new incomes for small and large scale ventures.

Four other institutions now use the micro financing format with government plans to triple Sri Lanka’s solar home systems by 2007. The sky’s wide open for solar power.

**Ari Ariyartne, Sarvodaya Movement**
With people’s participation and willingness, we want to build something not micro, we want to build something mega.

**NARRATOR**
India is home to over 15% of the world’s population but accounts for just 3.8% of global energy consumption. The country’s development and the industries driving it are hungry for energy, and demand is rapidly rising.
Sri Pathy, Sri Marudhamalai Andavan Cotton Mills
Now India is slowly developing and if there is a demand for power now, the demand is likely to grow in the future.

NARRATOR
Fossil fuel power stations are polluting and fuel prices are rising so the government is using incentives to encourage private investment in wind power schemes.

This rice processing factory was using ten thousand to twelve thousand rupees worth of diesel oil every day but wind farms mean reliable rural electricity and the company’s now switching over from diesel to the national grid.

Mohammed Naimayian, MN Agro Industries
The diesel rate has been going up gradually. Now it is twenty-eight rupees per litre. Being a rural area they used to cut power at six to seven, eight hours per day so there was power fluctuation also to us there and there was a problem in voltage and now we are getting better power for the past six to eight months, and that is the reason that we are switching.

NARRATOR
Wind farms in the Mupnahal area of Tamil Nadu have two and half thousand turbines that generate nine hundred megawatts in total.

Wind power is attracting private investment thanks to tax breaks and soft loans offered by the Indian renewable energy development agency and supported by the World Bank.

Turbine manufacturer Vestas has a factory in Chenai building the turbines to meet demand from private companies.

S D Singh, Vestas RRC
In Tamil Nadu we have cuts in the power and therefore each industrialist is owning diesel sets and every diesel price is increasing the wind sector becomes more and more attractive.

This entire wind installation which has been installed in Tamil Nadu, 95% is owned by the private sector and only 5%, even less than 5% by the government.

NARRATOR
The windmills of Tamil Nadu benefit from reliable winds but it’s the favourable economic as well as environmental conditions that are causing wind power to take off.

S D Singh
If wind is good and the regulations are good, the industry is prospering very well.