

# The TV of Tomorrow

by R N Sanyal

**H**IGH Definition Television (HDTV) is a new technology which has initiated a transformation of the world television industry. With its all-electronic 35 mm quality, wide screen picture and digital audio sound, it is revolutionising the production of television programmes, film making and advertising. It is opening up new business opportunities in medical science education, publishing, militarism, archiving and a couple of other applications.

HDTV will entail the total re-organisation of television's delivery system infrastructure and it will have profound impact on the world's electronic industry.

Hi-vision is an HDTV format with 1,125 scanning lines and an aspect ratio of 16:9. The continual NTSC system, now in use in the US and Japan, has 525 lines and an aspect ratio of 12:9 compared to its predecessor.

The HDTV picture is much clearer and wider and is said to be as good as 35 mm film. NHK (Japan Broadcasting Corporation) has been working on Hi-Vision since 1964. The HDTV signals are transmitted through the broadcasting center through fiber-optics cable. Then these signals beam up to the Intelsat Satellites and down again to Earth Stations in different countries of the world.

Hi-vision easily converts into 35 mm film, to Hi-vision

movies. Hi-vision postcards are pictures shot in Hi-vision and then printed as stills.

Doctors can use Hi-vision for medical purposes. By the combination of Hi-vision and computer technologies, still picture databases are produced

Convention (IBC) in Brighton, England which is known as HD-MAC. This system has been developed by EUREKA '95, a project launched by a consortium of companies from European Community (EC) countries. The system has

risks. Because the Japanese first developed HDTV and proposed a world production standard, Europe has developed another standard through the Eureka '95 project and the United States is moving to another.

Again, no one denies the desirability of any international



which can be used to store and retrieve still pictures stored on Hi-vision disc at the touch of buttons.

If museums and art galleries all over the world are connected by a Hi-vision network, visitors at any local museum can enjoy Hi-vision access to the world's most famous collections.

Another system of HDTV has been built up by International Broadcasting

1,250 scanning lines, compared to Hi-vision's 1,125, which is developed by Japan.

More and more countries are showing interest in HDTV — tomorrow's television. Under certain circumstances, the International Consultative Committee for Radiocommunications (ICCR) will decide which will be the standard of HDTV.

But on the question of standard, it may be fraught with

standard. It will facilitate and improve programme exchanges as conversion from one HDTV format to another seriously affects the picture quality. But electric wave spectrum differences and the economic needs of every country will ensure that the agreement of a standard will be difficult.

We all hope that this problem will be solved for the greater interest of mankind.

# Breakthroughs in Tales of the Travelling Tara

**F**OR the rural people living more than 4,000 metres above sea level on Bolivia's vast windswept plateau, the Altiplano, life is a constant battle against cold nights, a scorching daytime sun and a lack of water. Illnesses are frequent and food is scarce. Tough llama meat, mutton, and a few potatoes are all most people eat, and more than one child in five dies before the first birthday.

Less than seven per cent of the Altiplano's dispersed population had access to safe water. Rare bursts of rain are fast absorbed by the sandy soil. Surface water is salty, and often unsafe. But now a group of foreign aid agencies and Bolivian organizations are pooling their strengths to provide sustainable water and sanitation systems in communities throughout the Altiplano.

As the poorest country in South America, Bolivia receives the highest level of foreign aid. More than 600 non-governmental organizations (NGOs), nine United Nations agencies, the European Community, and many governments are actively giving assistance.

But in the water and sanitation sector, efforts until recently have been uncoordinated and have resulted in the duplication of activities in some regions, an absence of projects in others, the introduction of imported, unsuitable technologies, and little attention being given to training and health education.

A new pilot project, by contrast, features an unusual degree of agency co-operation, strong emphasis on health and community participation, and a leading role for the Yaku pump. The Altiplano's contribution to appropriate technology. Yaku is the Indian word for water.

The World Bank and UNDP oversee activities. The European Community's agency in the region, Programa de Autodesarrollo Campesino (PAC) handles the technical and financial aspects of the project, in co-operation with SKAT, a Swiss centre specializing in appropriate technology.

Project Concern, an international non-governmental organization, is managing the project's social features — providing nurses, health workers and community training — using methods developed by PROWESS, a UNDP project that specializes in the promotion of women in water and sanitation projects.

The Ministry of Health's local sanitation unit and the National Social Emergency Fund are also involved.

Many of these agencies have been involved in water supply projects on the Altiplano for several years. "Before, they were all doing their own thing," says Andrea Doucet, a Canadian sociologist who works for PROWESS. "That they're working effectively together is a real breakthrough."

PAC had experience in organizing funds for the beneficiaries to pay for small irrigation projects. "They were also good with community leaders," says Ms Doucet.

"But they were quick to

admit that they had been unlucky in their choice of pumps in the past and that they had little experience in health promotion and involving all the people."

What prompted this well-matched marriage of agencies was the birth of the Yaku. In a search for the best water supply technology in 1984, the World Bank started testing 17 different types of handpumps on the Altiplano under its joint water and sanitation programme with UNDP.

By the end of 1987, a Bolivian version of the Bangladesh pump called Tara had been nominated and blessed by government representatives and technical experts, and was christened Yaku.

"There's now a total consensus in favour of the pump," says Humberto Cordero, a Bolivian engineer who worked on the handpump testing project.

Arranging for local production of the pumps was not too difficult. CASAM, a factory that in the glory days of high tin prices made industrial chains

and 25 health workers were recruited from the 60 target communities to help the Indians understand the benefits of safe water and hygienic practices.

The nurses, who were trained in basic health care for a year, are stationed in the villages in order to identify the people's needs, and to provide health care services, which were lacking in most communities.

While the nurses and health workers stress the hygienic advantages of water from the Yaku pump, the PAC workers help organize local water committees and explain the credit scheme for purchasing the handpumps.

Each Yaku costs between US\$108 and \$138, depending on the depth of the well, while the rower, which allows water to spill back into the well, is only \$40.

Since getting enough food to eat is a more pressing need for many of the people, persuading them to opt for the Yaku was difficult. "Unfortunately, health concerns are still a low priority

have unacceptably high levels of salt and minerals, and many of the handpumps were not working effectively, or not supplying enough water for everyone in the surrounding area.

It took several months to assess the communities' needs, to organize the water committees and provide them with training.

But the project workers regard this stage as vital to the venture's success. They believe that lack of social preparation was the main reason why earlier efforts had no lasting benefit.

"In the past, agencies would just go in, install pumps or piped water systems, then move out, without involving the people or considering their traditions," says Ms Doucet.

Through the expertise of two local anthropologists with years of experience in the area, project workers learned that the Altiplano communities have a history of working together through a system of work committees — Ayni — dating back to pre-Columbian times.

The Ayni, which united people in the construction of houses and irrigation systems,



Agricultural production is difficult on the windswept heights of Bolivia's Altiplano.

for the mining industry, saw the invitation as a chance to pull itself out of a financial crisis.

Now 11 factory workers are assembling the orange Yakus, using imported steel and local plastic.

The project, which will serve as a model for a bigger effort due to begin in 1990, aims to bring water and sanitation facilities to 8,000 people living in 60 small dispersed communities in the remote department of Oruro.

One hundred and fifty Yaku pumps, which can pump at depths up to ten metres and are easy to maintain, are being installed with 150 cheaper pumps called "rowers," which are used for irrigation.

Recognizing the importance of involving the communities from the beginning of each project, 35 auxiliary nurses

among the people here," says Ms Doucet.

But with the help of the local nurses, improvements came gradually. Eva Vallejos, a nurse, persuaded all the women in one community to wash themselves and their clothes frequently.

Gradually, the scabies disappeared from their hands. Other nurses managed to persuade the families of some communities not to sleep on the floor beside their animals.

In organizing sessions with the health workers and nurses, the communities define their needs with the help of drawings, maps and cardboard models.

In some areas, people have access to a well or nearby stream. Some even have handpumps. But the surface water, and in some cases the underground water, were found to

and in tending cattle, is now the basis for water and health mobilization.

Soon, Bolivians in the department of Potosí will also get the chance to better their living conditions.

This larger project, designed by Ms Doucet, Mr Cordero and a Dutch consultant, and financed with \$3.6 million from the Government of the Netherlands, aims to bring safe water to 75,000 people in Potosí by installing 1,250 Yaku pumps and 1,250 latrines over four years.

Mr Cordero says he feels strongly that the multi-donor recipe that is proving so successful in Oruro can work elsewhere. "I'm convinced there is no other way. The Oruro model, which is also the Decade model, should become law."

— UNDP

# Cattle for a Handful of Purple Silk

by Dr Gisela Reinhardt-Reuter

**B**Y identifying these still yet somewhat unfamiliar snails and analysing new sources, the German theologian and archaeologist Dr. Gerhard Steigerwald, from Nurtigen, has now unravelled the manufacturing methods, colour spectrum and quality of this famous dye in his works *Purpursorten im Preisedikl Diokletians vom Jahre 301 (Varieties of the Colour Purple in Diocletian's Edict on Maximum Prices in 301 AD)* appearing in the *Internationale Zeitschrift für Byzantinistik (International Magazine for Byzantine Studies)* (Vol. XV, Amsterdam 1990) and *Die antike Purpurfarberie nach dem Bericht Plinius D. A. (The Graeco-Roman Purple Dyeing Process According to a Report by Pliny the Elder)* in *Tradition (Fordham University Press, New York 1986)*.

Once when Emperor Augustus complained to his dyer in Rome that his Tyrian purple mantle had become too dark, he was advised to view the garment from beneath. In reply the emperor asked if it was necessary for him to go up to his roof garden for Roman citizens to consider him well-dressed.

With this anecdote (from the Roman writer Macrobius in 400 B C), Steigerwald touches upon the striking characteristic of purple to change its intensity depending on the perspective of the viewer — referred to today as the "line" of

a piece of velvet. This effect had already been observed in ancient times: "When viewed from straight on, it looked black (nigricans aspectu), but when viewed from below, it sparkled (suspectu refugens)". "Nigricans" here probably means reddish-black, and was used by Pliny the Elder to denote the colour of coagulated blood.

The Phoenicians are re-

garded as inventors of the purple dye (phoinikeon = purple-red in Greek). From their craggy island capital, Tyros (in present-day Lebanon), they won over the highest echelons of Mediterranean society with this luxury commodity from the end of the 2nd century B C onwards, and acquired great riches and glory.

**Purple was probably the most costly and coveted dye of the Graeco-Roman world. A status symbol of emperors, kings and distinguished generals, trade in dye was first monopolised by the Phoenicians some 3000 years ago.**

The miraculous discovery of dye is related in a legend concerning a dog that bit into a snail on a beach in Tyros; on noticing the dark-red liquid, a shepherdess decided to use it to dye her garments. There is, however, one inconsistency in this tale: snails do not release a finished dye, but rather the

age and nutritional state of the animals and primarily on the manufacturing process of dye solution.

The snails were harvested between autumn and spring. The smallest ones were crushed together in their shells; the hypobranchial gland, which contains the preliminary stage of the dye, was removed from the large snails, while they were still alive, after three days in brine, the slimy mass was heated with water for 10 days at a constant temperature in a lead kettle, regulated by a hot-air outlet. The foreign bodies were then skimmed off and the clean silk or raw wool could then be dyed.

The dye change to various hues depending on the type of snail used: turning white-gray to yellow then to green shades, and then from blue to dark violet. The action of light was, of course, important here, since, as Julius Pollux, a Greek teacher of rhetoric in Athens in the second century, B C observed: "The colour purple loves to unite with the sun and her rays enkindle the colour."

To meet the ever-increasing demand, production of the dye was concentrated on isolated coastlines. This location may have also helped disperse the pungent odour from the bubbling mixture of dye and putrefying snails. The significance of the purple dye as a monarchical prestige symbol is apparent in the words of Theoderich the Great.

By applying the terms obscurities rubens (reddish darkness) or nigredo sanguinea (sanguine nigrescence), he has supplied us with an accurate description not only of the colour's effect, but also of its symbolic nature: "The dye distinguishes the ruling sovereign, focussing attention on him and raising him above the people, demonstrating conclusively that they are beholding their sovereign." Of similar symbolic quality was the privilege accorded to Byzantine emperors who signed their documents with genuine purple ink. (German Research Service)

# They Use Nuclear Technologies Effectively

**R**ECOGNIZING the development and improvement in the standard of living of large groups of the world's population which can be achieved through the safe and effective use of nuclear technologies, some 30 CRPs, or one-quarter of the research contract programme's activities, are carried out in this area.

The objective of a recently completed CRP on the analysis of research reactor cores for use of low enriched (LEU) fuels was to reduce the traffic of highly enriched uranium by conversion of reactors to use low enriched uranium. The CRP developed and verified analytical techniques for the

analysis of research reactor cores.

A completed CRP on methods for the calculation of fast neutron nuclear data for structural materials concentrated on the assessment of the reliability of the calculation methods used and identification of the most appropriate methods recommended for use in calculations of neutron cross-sections of the structural materials of fission and fusion reactors.

The CRP emphasized the improvements made possible in global optical models through the use of dispersion relations and the improved understanding of the significant role of collective excita-

tions in fast neutron reactions. Conclusions of this CRP will be published as an IAEA report in order to be of benefit to other specialists. A workshop will be organized on computation and analysis of nuclear data relevant to nuclear energy and safety in early 1992. It should provide a useful focus for further dissemination of the CRP results to scientists in developing countries.

One of the major recommendations of this CRP was that future work be concentrated on the problem of predicting the cross-sections for neutron induced reactions leading to alpha particle emission.

A new CRP responsive to

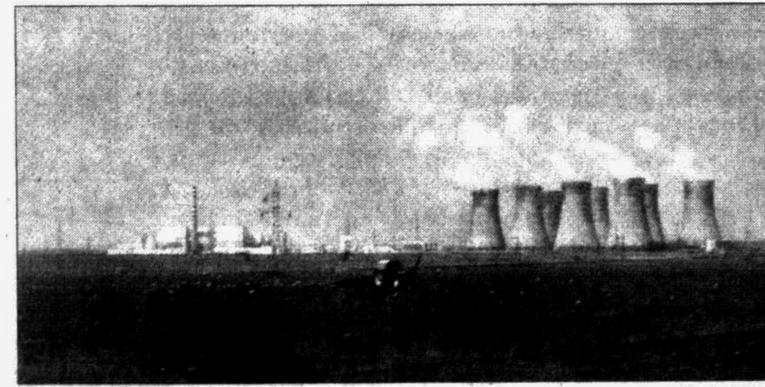
this recommendation is expected to be initiated in 1992. The participants also recommended further co-operation to unify and standardize nuclear model codes and their associated input parameter libraries.

In order to assist developing countries seeking to establish a capability for performing in-core fuel management (IEM), a CRP was carried out in the early 1980s to develop a consistent set of computer programme packages.

Packages have been developed for pressurized water reactors (PWR) and boiling water reactors (BWR) and are reported in TECDOC-314 entitled "In-core Fuel Management Programmes for Nuclear Power Reactors". These packages can be obtained free of charge through the NEA Data Bank and consist of a reference manual and a magnetic tape.

An ongoing CRP on safe management with burnable absorbers in WWERs is striving to enlarge the knowledge of fuel with burnable absorbers by carrying out experimental programmes and developing theoretical methods for cell calculations.

Detailed calculations are being performed in analysing various aspects of core behaviour in WWERs, when burnable absorbers are being used. The experimental results will be evaluated and compared with results of the developed methods. — IAEA.



Bohunice Nuclear Power Plant.

—Photo/IAEA

# Solar Power Lights up Rural India

by Prakash Chandra

**I**N the desert, near thick jungles or in the Himalayas, the dawn of solar power is rising in rural India.

As many as 50 remote villages spread across the country already boast of their own solar-powered electric plants which provide light, run community TV sets and pump water.

At least 400,000 home and street lights are generated by solar power, in addition to several hundred railway signals and 50 mini-electric plants in villages.

Industry analysts say some 75 million homes are potential beneficiaries of solar power as it gradually spreads. It is being promoted by the private sector and the Department of Non-Conventional Energy (DNCE).

"Solar electricity is the best option available for at least 10,000 remote villages," says Dr E V R Sastri, DNCE director.

"The aim right now is to help spread the concept of solar electricity in rural India," says K Subramanya, an executive in a Bangalore-based company which is setting up India's first dealer distribution network for solar-powered systems.

ties as well as villages in the states of Maharashtra, Andhra Pradesh, Madhya Pradesh, Gujarat and Mizoram.

A typical solar lantern is changed during the day through a panel which collects solar radiation and converts it to electricity. The lantern's

output is about the same as that of a 25-watt or 40-watt bulb. Light is generated up to four hours.

Jayant Shidhaye, director of Hyderabad-based company, claims he has sold over 3,000 lanterns around India. He points to ice-cream vendors in Bombay and small restaurants elsewhere which have bought portable solar-powered lanterns.

Another company has set up solar plants near Behre Dun, Tehri-Garhwal and Mathura in north India. They provide power to street lights all night as well as six hours of domestic lighting in the evenings.

India's ambitious plan to energise some 75 million homes by tapping solar energy is well and good. But it is constrained by an equally big concern — cost.

And it appears that despite

the government's intention to bring the benefits of solar energy to remote areas, it has not released sufficient resources to achieve its goal.

The DNCE plans to distribute solar-power systems which will generate 30 megawatts of electricity. This

will mean a budget of nearly 4,000 million rupees (US\$140 million), with the price of output for government-supported programmes fixed at 225 rupees (US\$7.90) per peak watt. The cost is much higher in the open market.

Dr J Gururaja, an industry analyst, blames the government for "insufficient budgetary support." He says the price of solar-power systems in India is significantly higher than imported ones because of higher input costs, duties and taxes.

Dr Gururaja contends, however, that despite the high initial cost of solar-power systems, they still turn out to be cost-effective when compared with other energy sources on a life cycle basis.

DNCE analysis shows, for instance, that at a load of 290

watts for two hours daily, solar-powered generators have a life cycle cost of 63,986 rupees (US\$2,245) over a period of 20 years as compared with 98,135 rupees (US\$3,443) for petrol generators over a period of just 10 years.

A solar-powered generator costs nearly seven times higher than a petrol generator. But maintenance cost for the former is only about 2 per cent of the cost as compared with 20 cent for the petrol generator.

In spite of the increasing use of solar energy, cost remains a major drawback. So much so that research efforts are now mainly focused on making solar power technology more affordable. Experiments are being undertaken to find which raw materials are likely to allow more efficient but less costly power generation.

Cost analysts are quite optimistic that Indian experts will eventually come up with solar energy equipment comparable with those made by international manufacturers.

Plans are afoot for setting up a pilot plant for producing high-technology solar-power systems now being manufactured in Western Europe.

— Depthnews Asia