

# International Development Enterprises India 2006



the **Ashden Awards**  
for sustainable energy

## Treadle pumps for improved agricultural productivity

### Summary

International Development Enterprises, India (IDEI) has commercialised low-cost treadle pumps for irrigation. Over 510,000 pumps have been sold in the rural areas of the Eastern part of India, bringing substantial benefits to farming families.

Many farmers in the plains of the North and East of India rely on a single annual crop such as wheat or maize, watered by the monsoon. The income which they derive is small, and this forces many to seek casual work in cities such as Lucknow for part of the year, often disrupting children's education since the whole family moves to the city. The water table in the region is consistently high, so out-of-season crops can be grown under irrigation if a pump is available. Affluent farmers can afford to buy and operate diesel pumps. Poorer farmers may also hire diesel pumps, but often at very high cost.

IDEI commercialised low-cost treadle pumps for irrigation. The pumps are designed to be simple for people of all ages to operate, and most members of a household, including children, can take part. Typically, the household will pump for two to eight hours a day. Poor farmers can now cultivate and sell a variety of crops outside the normal growing season and bring additional land under cultivation because it can be irrigated. The increase in family income means that the cost of the pump can be paid back from the profits of one extra harvest. All components of the pumps are manufactured locally, and IDEI has successfully developed a supply chain of manufacturers, distributors, retailers and installers.

The first prize Ashden Award to IDEI recognises the enormous improvement the low-cost treadle pump has made to the lives of many families in India, both the farmers who use the pumps and the different businesses in the supply chain.

### The organisation

IDEI has been marketing treadle pumps to farmers in India since 1991. It was initially part of IDE-International, but was legally registered as an Indian not-for-profit body in 2001 and is now an independent organisation employing 150 staff in six regional offices.

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## Technology and use

The treadle pumps are manufactured under the name 'Krishak Bandhu' (meaning 'farmer's friend'), and are simply designed for people of all ages to operate. The operator stands on two bamboo or metal treadles, and pedals them with his or her feet in an action similar to using a step machine. Bamboo is usually used for the treadles because it is strong enough and cheaper than metal. The treadles operate two metal pump cylinders which are connected to a tube well or the surface of a body of water. The tube well is a length of robust, flexible plastic pipe which is sunk into the ground until it reaches an aquifer. To begin operation, water is poured into the cylinders to 'prime' the pump. The user then starts pedalling, and water flows directly onto the land or into irrigation canals. The pedalling action is easily mastered and most members of a household, including children, can take turns at it. Typically, the household will pump for two to eight hours a day.

IDEI has developed five models of pump for commercial production, to suit different water conditions and different incomes. The pumps are designed to raise water through a maximum vertical distance of either seven or eight metres, and with maximum flow rates of up to 6,000 or 5,000 litres per hour.

All components of the pumps are manufactured locally, and IDEI has successfully developed a supply chain to produce and distribute them. The pumps are produced under the Krishak Bandhu (KB) brand by 17 licensed manufacturers, who sell through 284 distributors to around 1,850 dealers and 4,625 installers. Mechanics with expertise in tube wells are trained to install the pumps. 510,000 pumps had been installed by March 2006, bringing benefits to over 2.5 million people. There are no concerns at this stage that this will adversely affect the level of the water table, because it is replenished each year by the monsoon.

## How users pay

At the time of writing (July 2006), 85 Rupees (Rs) = UK£1 = US\$1.8

The cost of a treadle pump and tube well is about Rs 1,200 to 1,300 (£14 to £15), and farmers pay the full cost to the retailer. IDEI raise awareness among farmers about micro-credit facilities, buy-back arrangements and self-help groups. However, it is generally not a problem to borrow money, because people know that a farmer with enough land to benefit from a treadle pump will be able to repay the loan. In addition, IDEI requires dealers to offer 120 days' credit to farmers, so that farmers have time to harvest and sell their first crop before they have to pay for the pump.

## Training and support

The pumps have a one-year warranty and their expected life is eight to twelve years, depending on corrosion. The valve and washers need to be replaced annually. After one year, the owners have to pay for servicing. Generally, farmers find the pumps are very reliable.

IDEI has staff in a network of offices who provide support to end users. They advise new pump owners as to which crops they can plant and how to market them.

IDEI carried out three years of field trials under a variety of conditions prior to mass production of the pumps, and has continued to make improvements to the design. IDEI puts considerable effort into learning from dealers and end users. It solicits feedback from farmers and mechanics, and evaluates modifications to the design and distribution system as required.

The supply chain is tightly controlled. Manufacturers, dealers and retailers have to satisfy certain criteria in order to receive a license for the KB brand. Any company not performing to standard will lose their license. Imitation KB pumps sometimes appear on the market.

## **Benefits of the project**

The treadle pump is designed for small-scale irrigation and is cheap, so it brings particular benefits to low-income, small-holder farmers. About 58% of the treadle pumps have been sold to farmers who had not previously been able to afford any irrigation pump. They can now cultivate a variety of crops outside the normal growing season and sell them in the market or at roadside stalls. Additional land has been brought under cultivation because it can now be irrigated. The 'new' crops include papaya, onions, mustard, coriander, garlic, cauliflower, cabbage, arum, cucumber, potatoes and tomatoes.

A study has suggested that the annual income of a family has risen by Rs 11,000 (£130) on average as a result of using a treadle pump. This represents a substantial increase since the annual income for many farming families in this region is as low as Rs 7,000. Many farmers have doubled their income, and a few have seen it rise ten-fold. Farmers can easily pay back the Rs 1,200 to 1,300 cost of the pump from their increased earnings.

The increase in family income allows farming communities to remain on their land all year, rather than drift into poor urban areas to find casual work outside the growing season. This means that the children stay in school longer, since previously the whole family would move with the work. Many families now have a better diet due to the greater variety of crops grown, and the increased income pays for new houses, home improvements and education. Women in particular benefit from being able to participate in irrigation and having a more significant role in farming. Perhaps the most important benefit of increased income is that poor people have the opportunity to make choices for themselves.

About 42% of the treadle pumps are replacing diesel pumps, which were either purchased or hired when needed. There are a number of benefits from using treadle pumps rather than diesel. Diesel pumps operate at higher flow rates, which tends to wash the topsoil away (or to one edge of the field) and are not suited to crops that prefer light watering. The use of diesel emits both local pollutants (carbon monoxide, nitrogen oxides and particulates) and carbon dioxide. A typical diesel pump operated for four hours each day uses about 600 litres of diesel per year, resulting in 1.4 tonnes of carbon dioxide emission. This emission reduction has been certified under the Clean Development Mechanism (CDM). The cost of hiring a diesel pump can be up to Rs 3,000 per year, and they are often difficult to hire when needed as all farmers tend to need them at the same time.

The introduction of treadle pumps initially generated some resentment among large landowners, whose pool of cheap labour was reduced, and among diesel pump manufacturers. IDEI recognises that these are real issues which have to be worked through at local level, and need to be taken into account whenever the treadle pump promotion moves into new areas.

There is now a high demand for treadle pumps in the Eastern plains of India: estimated at 25,000 to 35,000 pumps per year. This demand creates substantial employment for manufacturers, distributors, retailers and mechanics. The pumps are manufactured in India and this generates about 1.56 million person-days of employment annually in the pump supply chain and over 4 million person-days in terms of farmer employment. IDEI estimates that the earnings from the total supply chain are about £119 million per year.

## **Management, finance and partnerships**

IDEI's central co-ordination office manages the treadle pump programme, assisted by three regional offices and several area offices. The regional offices help the pump manufacturers to develop the best production processes and to maintain high quality. The area offices identify the retailers and work with them and the regional office to promote the treadle pumps, and also train self-employed mechanics to install and repair the pumps. IDEI closely track all sales, and the socio-economic effects of using their pumps. Farmers are encouraged to report back on how their pumps are performing, and annual supply chain meetings are held to reinforce this.

By promoting the development of direct partnerships between manufacturers, distributors and dealers, IDEI intends to gradually reduce their direct involvement in the treadle pump programme.

The cost of IDEI management is funded mainly through grants and specific project earnings.

## **Use of the Ashden Award**

The Ashden Award to IDEI has been funded by Climate Care, an organisation which helps companies and individuals to counter their impact on climate change by funding new projects to reduce the emission of greenhouse gases.

Climate Care sponsored a first-prize Ashden Award to IDEI, because of the significant potential for greenhouse gas savings from using the Krishak Bandhu treadle pump. These savings have already been assessed and certified under the CDM. IDEI will use the Award to promote sales of treadle pumps in the new (and very poor) state of Chhattisgarh, where 80% of the population depend on agriculture. 2.2 million farmers manage an average of 1.5 hectares of land each, and only 20% of this land is currently irrigated.

*This report is based on information from the application submitted to the Ashden Awards by International Development Enterprises India, findings from a visit by one of the judges to see their work in India, discussions between Amitabha Sadangi and the Ashden judges at interview, and presentations by Amitabha Sadangi at Ashden Awards seminars.*

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