



Economically Sustainable Water Business Case Example – India Organically Growing from 3 to 1,000 Red Bird Systems

Cardinal Resources Inc., (OTCQB:CDNL), a global provider of patented sustainable, solar powered solutions for drinking water, waste water and environmental remediation prepared the following white paper reviewing the sustainability of the Red Bird System from the economic perspective. A great system like the Red Bird System is only one part of the sustainability puzzle. It must also be economically sustainable in the market. The following report presents one example. While focused on India and the NGO model, it can be applied in other emerging markets, and purchasers including communities, private water sellers, cooperatives, and utilities. The low cost of producing water with the Red Bird Systems gives the purchaser the ability to quickly recover the capital costs when selling water at market rates.

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Sustainable Water Financial Model Business Case Example: India Growing from 3 to 1,000 Red Bird Systems

Cardinal Resources Inc. (Cardinal Resources) has developed a business case showing how the purchase of three Red Bird Systems by organizations or communities in India lacking clean water could become a sustainable enterprise, with organic growth resulting in up to 1,000 units in use throughout the country within a few years. While focused on India, the same principles can apply in other markets and with other purchasers such as individual water sellers, communities, or utilities.

The term *sustainability* has many different meanings, but for the purpose of this analysis, we are defining it as:

- The ownership for the individual Red Bird Systems would eventually be transferred from Cardinal Resources to a responsible organization or community group.
- High-quality treated water produced by the Red Bird System would be sold to members of a community at a reasonable market price.
- The purchase price of the Red Bird System would be paid off over time by water sales.
- Once capital costs are recouped, the operation and maintenance costs of the Red Bird System, and a reasonable profit, would be generated by the sale of water.
- The success of the Red Bird System in a community, along with a long-term marketing campaign, would encourage other organizations, communities, or entrepreneurs to invest in their own Red Bird Systems.

There are potentially many approaches to making the Red Bird System a success in India.

- Whether marketing to a community, government agency, or Non-Governmental Organization (NGO), the system should not be marketed as a solution for the poor. This does not mean that the Red Bird System will not be affordable, but that by implicitly targeting the poor, the effect is to lower the value of the product rather than to make it more desirable. If the system is perceived as one that will deliver pure, great-tasting water suitable for an up-and-coming community, then it is more likely that a poor community will see it as a worthy aspiration.
- Even though the Red Bird System is housed in durable, affordable intermodal containers, we want to make the containers and systems beautiful. What qualifies as beautiful will vary from place to place, but by planning to make the exterior housing for the system attractive, with graphic designs denoting purity and quality, a community will be more likely to show it off and promote its use.
- We want to market the systems as producing high-quality water that people will find worth paying for at a fair but not discounted price. If a system is sold with the idea that the water should be free or heavily subsidized for consumers, the treated water will not have as much value as if a reasonable price is paid for it. In the U.S. and around the world, rich people and poor people alike are willing to pay a premium for bottled water because it is perceived as pure, palatable, and fashionable, and we want to market the Red Bird water in the same way.

Two related models for ramping up the Red Bird System for communities in need in India are presented:

- The first model is for a respected local health- or education-based NGO, such as a hospital, school, or clinic, to acquire and operate a Red Bird System for its own use, while selling excess water to the community.
- The second model is for a local village development committee to ultimately own and become responsible for the Red Bird System, after a two-year management period by Cardinal Resources or a local NGO.

Under both models Cardinal Resources and our local partner's roles would be similar:

- Identifying suitable NGO partners and communities
- Providing and administering loans for the purchase of Red Bird Systems where needed
- Monitoring the success of Red Bird Systems training and promoting adaptation in other candidate communities

Under both models, a pay-per-use approach is assumed, where a person pays a fixed price for a fixed amount of water. Under the pay-per-use model, consumers pay as they use the water, and the impact on their cash flow is minimized. Alternative models that could be considered are pay-per-household, or a combination of pay-per-household to become part of the water system and thereafter pay-per-use.

School-Healthcare Facility Model

The model is to sell Red Bird Systems, with financing, to established in-country NGOs that promote health and education. The NGOs use as much of the water as they need and sell the rest at a fair price in a community that needs clean water. The profits go to pay off their capital costs and ultimately to support their underlying mission.

It is not unusual for nonprofits to have side businesses that promote their brand and help support their wider mission. For example, the Sierra Club sells note cards and calendars to promote preservation of natural places. Goodwill Industries sells refurbished computers to help support training and jobs for adults with disabilities.

Why health- and education-based NGOs?

We suggest working with established health- and education-based NGOs because:

- They are credible and well-established in low-income communities.
- They have educated and trustworthy management teams in place that can help administer the programs.
- They have workers (for example groundskeepers and maintenance personnel) who can be trained as operators.
- They have a need for clean water, understand its importance in health and community development, and are equipped to communicate the importance of clean water to their communities.

- They are always looking for funding for their basic missions, and are highly motivated to make their underlying missions successful.

How can this approach grow from three Red Birds to 1,000?

Using the simplified assumptions shown below, a reasonable case can be made that the number of NGOs using Red Bird Systems to provide clean water for their schools and hospitals, while making money to strengthen their operations, can grow to 1,000 in a few years.

What are the numbers and assumptions?

Purchase price	\$ 180,310
Tanks, taps, and site set-up	\$ 6,000
Shipping and delivery	\$ 8,000
Annual labor costs (operation, maintenance, container washing, administrative)	\$ 3,000
Annual maintenance cost (supplies, equipment, payment into reserve fund)	\$ 1,500
Unit cost of water sold (per 3-gallon/12-liter container)	\$0.034
System peak water output	20 gallons/minute or 76 liters/minute
Assumed annualized daily water output: 70% of peak output	20,000 gallons/day or 76,000 liters/day
Annual water production	7.3 million gallons or 27.7 million liters
Number of containers	2,300,000
Value of water sold per year	\$ 78,200

Under these assumptions, an NGO would be able to pay off the entire Red Bird System in two to three years at 0% interest, while providing clean water for their institutions and communities. If a two-year, 5% annual simple interest loan is assumed, the payback period would be extended a few months, but would still be less than three years. Payment plans for different terms, allowing the NGO to pay off the loan more slowly and put some of the revenue back into their own operations from the start could also be arranged. For simplicity, fast payback and no interest is assumed:

- Purchase price, shipping, set-up - \$ 194,310
- Annual maintenance - \$ 1,500
- Annual labor - \$ 3,000
- Annual water sales - \$ 78,200
- Payback - 2.5 years

We believe we would be able to triple the deployment of the Red Bird to NGOs in India every year (3 for Year 1; 9 additional for Year 2; etc.). Total cumulative sales exceeding 1,000 could be achieved by Year 6, and annual sales exceeding 2,000 could be achieved by the end of Year 7 under this model.

Local Business Development Committee Model

The Byrraju Foundation provides an example of successful implementation of the pay-per-use model for water delivery to the poor in India. As detailed in a 2009 Monitor Group report,¹ the Byrraju Foundation has built 57 reverse osmosis treatment plants in Andhra Pradesh. The treated water is sold in 12-liter containers for Rs. 1.5. About half of the Byrraju customers earn less than Rs. 60 to 70 per day. The treatment facilities are operated and maintained by a local gram vikas samiti (GVS; village development committee), which employs two village residents as treatment system operators and two helpers. The Byrraju Foundation provides support for the systems by performing biweekly sampling of treated water. Residents of the village are required to contribute about 75% of the construction costs of the treatment system, while the Byrraju Foundation donates the remaining plant costs. More than 75% of the Byrraju plants are profitable.

Under the Local Business Development Committee Model, we anticipate that operation and expansion of Red Bird Systems in India would best be facilitated by Cardinal Resources, with help from NGOs, working closely with local community organizations to operate and maintain the systems. Specifically, we propose under this NGO model that:

1. The three initial Red Bird Systems are purchased by the NGO.
2. Three communities are identified for installation of the Red Bird systems that meet the following criteria:
 - a. Well organized with a history of water purchases and understanding of the cost
 - b. A down payment ranging from 5% to 20% of the purchase price, shipping, and site set-up would need to be raised by communities desiring a Red Bird System.
 - c. The three communities selected for the first Red Bird Systems should be considered opinion leaders in the region.
 - d. Selection of communities might be done through a contest, with Red Birds being awarded to the three communities that are able to pledge the most money.
 - e. The NGO and/or Cardinal Resources would initially own and pay for the operation of the installed Red Bird Systems; however, ownership would be transferred to the communities after two years under a lease-to-own agreement.
3. The communities would need to have a leadership organization (such as the village development committees in Andhra Pradesh) suited to the following responsibilities:
 - a. Hiring and management of Red Bird operators
 - b. Hiring and management of community educators
 - c. Hiring and management of unskilled helpers
 - d. Collection of fees from consumers
 - e. Making lease payments to the NGO
 - f. Use of profits from Red Bird operation for suitable community needs
4. All profits from operation of the Red Bird Systems during the first two years (NGO-owned and operated), as well as lease payments made by the communities after the initial two-year period, would be used to purchase additional Red Bird Systems for additional communities.

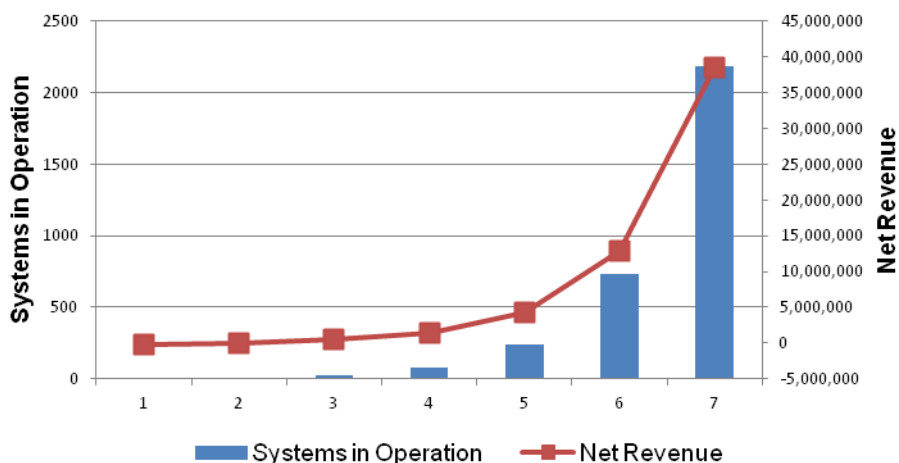
¹ Karamchandani, A., et al., Emerging Markets, Emerging Models: Market-Based Solutions to the Challenges of Global Poverty, Monitor Group, 2009.

Depending on the community, treated Red Bird water could be sold in 12-liter bottles, as in the Byrraju Foundation example, or via a piped distribution network. If sold in bottles, the bottle washing would be required as part of operation of the Red Bird. Bottle delivery could be offered for an additional fee to consumers. If sold through a piped distribution network, then the community leadership organization would levy a sign-up fee for households, to help with lease payments and to convey value to the connection to the distribution system.

Regardless of whether water is sold in bottles or via a piped network, community education on the importance of drinking treated water would be a crucial component of Red Bird success. Such education and marketing would need to emphasize the benefits of Red Bird water over existing sources, including: regular availability of the water, health and taste benefits, and the reliance on solar power.

Using this business model, there would be sufficient revenue generated by Red Bird operation to grow the number of Red Birds to 1,000 units within six to seven years, as shown in the figure below. This assumes 20% down payments and investment of profits to purchase additional Red Bird Systems. Operations would become cash positive between years 2 and 3. The assumption in this model is that the systems are highly utilized, that is, the water produced is sold. Modeling shows that if sales are 20 percent less than the production volume, the project would still be cash positive between years 2 and 3, but revenues would be considerably less. The sensitivity of the economics to water sales points out the critical importance of marketing, education, and technical support to ramp up adoption and sales.

Net Revenue Assuming Sales Meet Production



Additional assumptions used to determine the rate of Red Bird expansion under this scenario are:

Costs

Capital cost (system, site preparation, tanks, shipping) from page 3:	\$ 194,310
Annual labor, operations, and maintenance costs, from page 3:	\$ 4,500

Revenues

From water sales during two-year ownership period

Annual gross revenue from water sales, from page 3:	\$ 78,200
Annual net revenue from water sales (annual revenue less annual costs):	\$73,700

From lease payments during five-year lease period

	5% down <u>payment</u>	20% down <u>payment</u>
Down payment on system, shipping, and set-up	\$ 9,941	\$39,762
Lease term	5 years/260 weeks	5 years/260 weeks
Lease interest rate	5%	5%
Weekly lease payment	\$ 821	\$ 692
Annual revenues from lease payments	\$ 42,710	\$ 35,984