



## **Growing Inclusive Markets**

Business Works for Development • Development Works for Business

CASE STUDY

**West Africa • Senegal**

### **Wind, Water for Life (Du vent, de l'Eau pour la Vie, VEV)**

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**Name of lead organization • VEV**

**Sector : Water, Wind**

**Type of lead organization : MSME**





## Executive Summary

Founded in Senegal in 1991, ‘Du Vent, de l’Eau pour la Vie’ or VEV is a wind pump company that grew out of a project run by an Italian Non Governmental Organization (NGO) called Lay Volunteers International Association (LVIA). Mr. Michel Tine, a former LVIA employee, started VEV due to his passion for the work. Access to water is a major issue in Senegal and these wind-powered water pumps have provided numerous social, economic and environmental benefits to the communities, such as income from growing gardens, improved health and time saved from decreased water transportation. VEV repairs and maintains the pumps installed during the time of LVIA with locally made parts. It additionally manufactures new wind pumps on site and installs them in new locations. Repairs and new installations can be relatively expensive for the communities and part of VEV’s continued success lays in its work with village water committees and partners. While VEV has faced challenges through the years, it has survived for almost 20 years and has created a sustainable model to provide continued access to water to dozens of communities around the country.

## Introduction

Mr. Michel Tine went to work one sunny morning in 1991 excited as usual about his job. For the last four years, he had been working as head technician for Lay Volunteers International Association (LVIA), an Italian international development organization that was working on community wind-powered water pumps in Thiès, Senegal, about 70 km from the capital city of Dakar. Since they had begun working in Senegal in 1981, LVIA had dug wells and installed 130 wind-powered water pumping systems in rural villages in the Thiès, Diourbel, Saint-Louis and Casamance regions of Senegal. While providing access to water was the immediate goal, LVIA ultimately aimed to create local self-reliance through the training of water technicians and the improvement of management skills. It was for this reason that they had made an early switch from importing wind pumps from Italy to establishing a local wind pump manufacturing workshop in Thiès. In addition to making and installing the pumps, LVIA worked with the communities to set up water management committees to ensure the sustainability of the project in each village. They also spent time promoting small vegetable gardens, which were not possible before the installation of the water pumps due to a lack of water.

When Michel arrived at work, he noticed his boss, Mr. De Lotto, looked worried. Michel went to ask what was wrong and found out that LVIA’s funding for their Senegal project was ending and that Mr. De Lotto intended to close the workshop and sell the equipment. Michel had experienced firsthand the impact access to a safe and convenient water supply had on people’s lives in rural communities like Leona Niang, a tiny village 8 km from Thiès, and he was determined to continue their work. The wind pumps required regular maintenance and



occasional larger repairs and, without this, dozens of villages and thousands of people would soon see their water systems fall into disrepair.

## Context

### SENEGAL COUNTRY CONTEXT

Senegal is a country located in West Africa and was a French colony until 1960. Senegal is slightly smaller than Great Britain with a predominantly rural population of almost 11 million. The capital city of Dakar was built by the former colonial power as an administrative centre (see map, Figure 1). The economy is predominantly agricultural, and this sector accounts for 70% of employment and 18% of GDP according to state statistics. Industry accounts for some 27% of GDP and important industries include: agricultural and fish processing, phosphate mining, fertiliser production, petroleum refining and building materials production. In recent years, stringent economic reforms and privatisation have helped to foster a GDP growth rate of around 5% per annum. Foreign investment continues a reasonably steady rise while inflation is fluctuating around 3 to 4%. Though their advocates tout them as unavoidable and only short-term, recent economic reforms have come with a high social cost. Senegal has a heavy international debt burden and receives substantial economic aid. The country is in the sahelien zone and lives under the environmental influence of the Sahara desert.

### ENERGY CONTEXT



Map of Senegal (Source: [wikitravel.org/en/senegal](http://wikitravel.org/en/senegal))

All of Senegal's electricity production comes from burning fossil fuels. The nation also consumes all of the natural gas it produces, and imports more than 30,000 barrels of oil per day according to the National Energy Department. In the last two decades, the country has been trying to provide electricity to poor rural communities. According to state authorities, Senegal has the potential to develop solar and wind energy in regions like Thiès. Energy to pump water would be very helpful in reducing poverty through safe water supply, sustainable gardening and income generation in rural areas like Leona Niang.

### WATER ISSUES

Senegal has been witnessing serious environmental problems with a pattern of periodic droughts, deforestation, over-grazing, soil erosion and desertification. Issues of providing safe water to low-income, rural, Senegalese households are becoming ever more critical. Safe



water is being distributed by the State Water Agency SONEES (Société Nationale d'Exploitation des Eaux du Sénégal) - that later became SDE (Société des Eaux) - using electric energy in urban areas in the country. In the cities, SONEES supplies water to people with regular and steady incomes. According to the the International Water and Sanitation Centre (IWSC, 2000) Water is quite expensive in the country with monthly water expenses estimated at US\$50 for an average urban household of 5 people. Rural areas mostly depend on hauling water from traditional wells, which often dry out, and it takes tremendous efforts to find water for domestic needs. In rural areas, farmers are extremely poor and water is scarce. The burden mostly lies on women roaming three to four miles every day searching for water in neighbouring villages. Water is barely found for domestic needs, not to mention water needed for livestock. Leona Niang is one of those villages that face water shortages on a daily basis. In 2004, a Cholera outbreak caused by contaminated drinking water highlighted the need for clean water sources in rural communities. Access to clean water is fundamental issue for better health and improved quality of life.

To solve this urgent problem, wind water pumps were installed by the international aid agency LVIA. Due to favourable conditions in Senegal, wind pumps are supposed to be the most cost effective way according to LVIA's own technical and financial estimates. However, due to a lack of skills and knowledge, the problems of maintenance remained.

## Michel Tine and the VEV Idea



Fig. 2: Michel Tine, (second standing from left and VEV employees (Photo credit: Mamadou Gaye)

When Mr. De Lotto broke the news to Michel Tine (compare fig. 2) that LVIA was discontinuing its wind water pumps operations, Michel immediately sought out to his co-workers, Francois and Denis NDione, and discussed what they might do. All three men were dedicated employees at LVIA and wanted to make sure that the wind pumps they had installed continued to service poor rural communities. They quickly came back to Mr. De Lotto with a proposal for them to turn the project into a business of providing maintenance and repairs to the wind pumps installed by LVIA that Michel, Francois and Denis

would run and manage. As a sign of his willingness to run the proposed new venture on a commercial basis, Michel told De Lotto that he was ready to shift from his current salary of US\$500 per month to a salary of US\$200 per month. The other two partners were also willing to work for a reduced salary of US\$100 per month. Mr. De Lotto and Michel worked out a deal where Michel would purchase the equipment and the spare parts and materials in the workshop for US\$6,000. At this moment Michel was still thinking about how to find a way to



pay this purchase. Michel called their new venture Vent, de l'Eau pour la Vie (VEV), or 'Wind, Water for Life'.

## VEV'S VALUE PROPOSITION AND BUSINESS MODEL

*"Our village Leona is one of the 130 villages that originally benefited from the installation of a wind pump by the LVIA project and is located about 5 miles from VEV's workshop. Before the LVIA project, we were just searching for wells in the neighbourhoods to haul water, now our wives have much more time to do other activities that generate income and they can enjoy their spare time."*

- August Talla Diop, a villager of Leona Niang

In order to illustrate VEV's value proposition and business model, Michel recalled the small village of Leona Niang near Thiès. A typical Senegalese rural community, Leona Niang relied on an 80 meter deep tube well and a wind water pump that had been installed by LVIA for access to water. Leona Niang did not have access to the electricity grid and pumping water by hand from 80 meters would have been extremely labour intensive, if possible at all. Diesel powered water pumps were available, but fuel and maintenance was expensive. Since Senegal generally had a good level of wind resource (with wind blowing for about 9 months of the year), LVIA had decided on wind water pumps as the most appropriate and affordable water pumping technology.



Fig. 3: The water wind pump in Leona Niang  
(Photo credit: Mamadou Gaye)

In Leona Niang the wind pump system was installed 100 meters away from the centre of the community. The wind pump comprised of an 80 meter deep, covered well, a water storage tank, a six-foot bladed rotor and support tower (see figure 3). They can lift up to 180 gallons of water per hour with 15 to 20 miles per hour wind. The Leona Niang water pump draws water from the well into the large concrete reservoir. This reservoir is connected by underground pipes to a public faucet conveniently located in the centre of the village (see figure 4). The reservoir feeds the public faucet due to gravity. With the pump, villagers in Leona Niang no longer have to walk long distances to find water or draw water from a well manually.

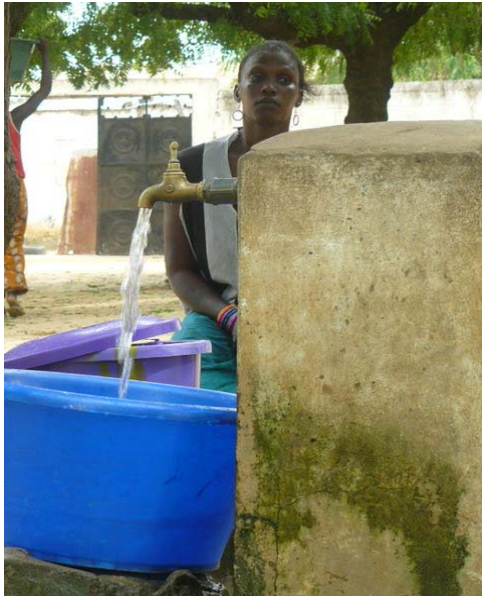


Fig. 4: The public faucet in Leona Niang (Photo credit: Mamadou Gaye)

The water distribution service is managed by a **community water committee** comprised of a President, a Secretary (in the case of Leona Niang, Mr. Talla Diop), the Village Chief and six women who work as fee collectors at the public faucet where people come to buy water. Every woman works two consecutive days. The price structure for people who live in the village is as follows: CFA 10.00 (about two cents) for the 20-liter bucket; CFA 150.00 (32 cents) for a 200-liter barrel. The money collected by the women is given to the Secretary who writes down the amount and then remits the cash to the Village Chief. At the end of the month, the money is divided in three parts: 1/3 is given to the women who sell the water and 2/3 is deposited into a bank account to pay for potential repair fees.

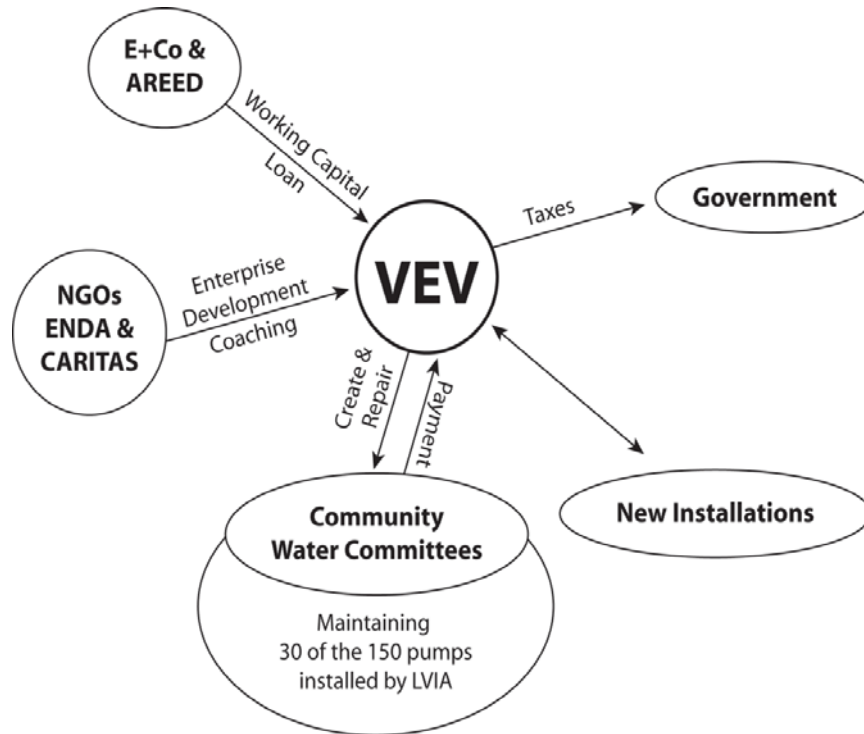
Michel Tine envisioned a business model in which VEV would address the need for long-term repairs of the wind pumps installed by LVIA in the 130 villages. He and his business partners had the expertise in making and installing the wind pumps. In addition, he was familiar with the communities LVIA had worked with and their water management committees. He already had the contacts and had built a relationship of trust with villages like Leona Niang and dozens of others. Michel knew that the villages and their pumps would need servicing and that VEV would now be the only local group who had the expertise to fill this niche market. Maintenance activities that VEV would undertake would include changing the gear oil (required about once a year), greasing the windmill, changing the water screws, repairing pipes and disinfecting the water storage tank. The only expensive and complicated repair was that of a broken spring. The reason why this was expensive was that the spring was the one part that could not be produced locally, but needed to be imported from Italy. Village water committees targeted budgeting US\$40 a month to maintain their wind pumps and Michel estimated that there was a demand for about 300 repair calls per year. It was from this need and potential revenue stream that VEV would have its business.

## Michel's Quest for Partners

Michael Tine and his business partners had a business proposition and an established network of potential clients, but needed to develop their business skills and raise the US\$6,000 in capital to purchase the equipment and assets of the LVIA project and to be able to go into business on their own. To do this, Michel embarked on a quest for partners, each of which are described below and illustrated together in Figure 5.



Figure 5: VEV's Partners



### **CARITAS**

Michel was a catholic by religion and also a well known member of CARITAS Senegal, an international catholic philanthropic organization that has assisted poor communities in Senegal since the country's independence. Michel approached his catholic congregation in Thiès for help and asked them to get in touch with the organization, Environmental Development Action (ENDA), a Senegalese NGO interested in renewable energy development. CARITAS had branches in different regions of the country. Through CARITAS-Thiès, they introduced VEV to ENDA's renewable energy programs. CARITAS also helped mentor Michel in VEV's start-up phase and did not ask for any payment for their services.

### **GOVERNMENT**

In order for Michel and VEV to get official government permission to take over the LVIA project, CARITAS needed to prove to the State Water Authorities that Michel and his colleagues would be able to effectively maintain the pumps installed by LVIA in the region. The State Authorities ultimately granted them permission and even agreed that VEV could receive tax relief for the part of the wind pump that had to be imported from Italy.

### **ENVIRONMENTAL DEVELOPMENT ACTION (ENDA)**

ENDA had been working with Senegalese communities for 30 years in different projects related to poverty alleviation, health, women's empowerment, child vulnerability and adaptation to climate change. They implement and monitor different projects in the Thiès



region with the help of international donors using participatory and community based approaches. ENDA contributes to communicating with rural populations in Thiès on renewable energy possibilities as well as training them in different environmental and social related issues. ENDA was introduced to Michel and VEV through CARITAS-Thiès. Consequently, ENDA introduced VEV to AREED, the United Nation's African Rural Energy Enterprise Development Initiative. ENDA did not ask for any payment for their networking service.

### **UNITED NATIONS ENVIRONMENT PROGRAMME'S AFRICAN RURAL ENERGY ENTERPRISE DEVELOPMENT INITIATIVE (AREED)**

AREED was first established in Africa in 1999 with US\$2 million in seed capital from the United Nations Foundation and has since grown to a loan fund of over US\$15 million. The AREED fund is managed by the NGO E+Co. The AREED program is a partnership between the United Nations Foundation, UNEP, other donors and investors as well as local African implementing partners such as ENDA and E+Co. AREED's assistance is aiming to work with the sponsors in the US and in Europe to help small ventures grow into sustainable businesses. AREED assisted VEV in securing a loan from E+Co.

### **E+CO**

E+Co is an international NGO, with 16 years of experience assisting small and growing clean energy businesses in developing countries. Their philosophy is to fund small ventures to provide affordable energy in poor communities. E+Co is operating in different countries in Africa. The Dakar office is run separately under the UNEP and AREED's supervision. E+Co pioneered and was the leading practitioner of the enterprise-centred model of investing in the clean energy sector, which puts the local entrepreneur at the centre of financing and business support services. As of 2009, E+Co has invested in 136 entrepreneurs in over 30 countries, leveraging more than US\$150 million of co-financing from public and private sources.

VEV was introduced to E+Co and they asked Michel to submit a formal application for a loan. However, Michel did not have the writing skills for such an application, so he sought assistance from ENDA and CARITAS to prepare the application. With the assistance of ENDA and the supervision of AREED, E+Co provided a US\$22,395 loan to VEV to be able to take over the LVIA workshop in Thiès and begin operating as a business. The loan was to be repaid over five years at 12% interest with a six-month grace period on principal. In addition to the US\$6,000 payment to LVIA, the loan would pay for working capital, equipment purchases, buying a used truck and maintaining an inventory of spare parts. With this loan, VEV could rehabilitate and upgrade non-working pumps for a profit and increase its client base by bringing more pumps into operation.

### **NGO ALIZÉS**

After the loan from E+Co, Michel and his team went into business repairing wind-powered water pumps. As they became comfortable with the wind pump repair business, Michel sought opportunities to grow and expand the business and began to build a partnership with ALIZÉS, a French NGO operating in the northern part of Senegal.





The city of Saint-Louis in Senegal and the city of Lille in France have been sister cities for over two decades. ALIZÉS is the French NGO working with Senegalese communities through the Lille partnership. ALIZÉS has installed approximately 40 wind pumps (and some solar photovoltaic pumps) since 1997 using French technology. The North-western parts of Senegal near the Senegal River have rice growing fields and wanted to develop renewable energy systems. Michel had developed a relationship with ALIZÉS, and VEV was contracted by ALIZÉS in 2007 to install a new wind pump and conduct follow-up maintenance. ALIZÉS paid US\$11,000 to VEV to build the pumping system, which was an attractive price compared to new competitors in the region who were charging US\$15,000. With ALIZÉS contacts in Mauritania near the northern border of the country, Michel started talks in August 2009 with local businessmen there interested in wind pump technology.

## **Constraints and Solution Strategies**

### **KNOWLEDGE AND SKILLS**

One of the major constraints faced by VEV in the very beginning was a lack of knowledge and skills to write business proposals and a sound business plan. The solution strategy laid in the mentorship of ENDA and CARITAS which provided VEV with management expertise and coaching.

### **VILLAGE FINANCING ARRANGEMENTS**

The village water pumping systems sometimes need expensive repairs that village water committees have difficulty paying. This is a serious constraint for the sustainability of VEV's business model and its growth prospects. However, to cope with the constraint, Michel and VEV developed a number of strategies. Firstly, Michel and his team worked out financing arrangements to allow the villagers to put the pump back into working order as soon as possible. For example, although the Leona Niang pump started working in 1991, it experienced a major breakdown in 1992 that cost the community 800,000 CFA (US\$1,600). Since the community water committee had not made enough savings from the water sales to pay the amount needed for repairs, and the community of Leona Niang itself had limited financial resources, a solution strategy was crafted by VEV and its partners. An agreement was made between VEV and the villagers to pay back 25,000 CFA a month (US\$50) for 32 months to repair the pump. Secondly, VEV asked the water committees to buy some spare parts upfront during good rainy seasons, when they had the means to do so.

While LVIA set up the committees, they may not have given them all of the tools to assess the market and accurately set the selling price for water. Consequently, some communities may need to increase the price of their water in order to be able to fully cover the cost of repairs. The community water committees - like the one in Leona Niang - have wind pumps that require maintenance or repair but they sometimes do not have enough money saved during the dry season from selling water at the faucets. Hence, villagers themselves have developed strategies for financing repairs. These strategies include asking Michel and VEV to



find shop owners or other sources of loans that they could access, selling additional water to other villages to raise money, or organizing a village-wide fundraising drive.

### **BUSINESS FINANCING ARRANGEMENTS**

VEV is currently beginning to face a lack of adequate equipment. This includes a compressor for digging and 4x4 vehicles to reach the communities. VEV could also benefit from increasing its inventory of spare parts. These factors cause delays in service, which costs the company money. These limitations are directly related to the lack of working capital. With the ability to write loan proposals and lay out his business plan, Michel needs to work to raise additional funds for new equipment and inventory.

## **Results**

Among the many daily challenges that Senegalese rural communities face, access to water is one of the top priorities because it is a necessity for all aspects of life. The services offered by VEV contribute to positive economic, social and environmental impacts in villagers' lives.

### **ECONOMIC RESULTS**

VEV has created jobs for ten people and pays a total of US\$2,000 per month in salaries. This means an estimated US\$200 salary a month for each employee, which is an average salary of a qualified technician in the sub-region. VEV employees not only provide for themselves but also for their families. Michel himself as the owner and manager earns now US\$800 monthly. He has already paid all the loans and dues to LVIA and E+CO. In addition to employing people directly, VEV helps sustain water selling jobs for six people in Leona Niang and between six to ten people in 110 other villages. In sum, VEV helps sustain between 660 and 1,100 jobs in the country. A water selling job pays an estimated US\$100 a month which is a good monthly pay check for a starting school teacher in Senegal. VEV's operations also helps sustain and advance the skills of a variety of metal workers and craftsmen in and around the town of Thiès. VEV has developed a small economy around the workshop which in turn impacts many lives in rural areas. In addition, according to Michel, VEV paid local communal and national taxes of six to seven million CFA (US\$14,000) in 2009, supporting the broader provision of social services in the country.

### **SOCIAL RESULTS**

It was the social impacts of these wind-powered pumps that motivated Michel and his colleagues to create VEV and continue providing services to rural communities in Senegal. They had centred their business model on ensuring the provision of these end use benefits. As of 2008, the pumps that VEV maintained have provided 43,175 people in 130 villages with access to clean water and have pumped a combined total of 1,859,259,750 litres of water. This is an amazing accomplishment for an enterprise with only ten employees. Despite its size, all of the employees interviewed cited the strength and capacity of the staff as one of the greatest strengths of VEV. Everyone, except the head technician, works five to eight hour days and less than six days a week and seems relatively satisfied with their job. The day



labourers, who all work on welding and installations on a need-be basis, brought up one major complaint which was that work was sometimes sporadic and that they would prefer to be able to have regular full-time work.

One of the greatest benefits identified by the villagers was the amount of time saved by the women. Without functioning wind water pumps, village women would have to walk km to reach their water source and then trek back carrying heavy water-laden buckets. With well maintained village water systems, the burden on women has been greatly decreased. Villagers see the maintenance of their water pumps and systems as a positive step towards gender equality. It was a noticeable fact in villages like Leona that getting water for household use was an activity that involved more women than men. If there was no functioning wind pumps, women wouldn't have the time to engage in income generating activities like selling in the village market.

Another commonly cited benefit by the villagers is the ability to grow gardens as a result of on-site access to water (subsistence farming). Without functioning water systems, there would not be enough water to grow vegetable gardens. The gardens provide increased income to the families as well as access to fresh vegetables, which provides nutrition to the community. Water demand is growing, and almost all of the communities would like to increase their water pumping capacity to increase their cultivation and irrigation of gardens. In addition to gardens, water is also used for livestock and masonry in housing projects.

Access to water has also increased the level of hygiene and decreased illness according to villagers. Because the water is pumped from very low levels, the water is cleaner than the well water that the villages were previously using.

## **ENVIRONMENTAL RESULTS**

The continual maintenance and use of the pumps demonstrates that wind power is a viable source of renewable energy in Senegal. The pumps also displace the use of diesel generators and eliminate carbon dioxide emissions (CO<sub>2</sub>) and other pollutants (including noise pollution) that are associated with this energy source. Thus, the initial choice of wind pumps had resulted in possible emission avoidance.

A possible negative environmental impact that has not yet been looked into is the possibility of depleting water tables. As demand grows and water supply shrinks, the water tables will begin to get lower according to state estimates. While these wind pumps were not the only actor in this sphere, and government approvals are required for all water wells, it was a consideration when deciding on location and capacity of future wind pumps.

In addition, the welding involved in the production process is energy intensive and thus uses electricity, which is currently being supplied by the national grid through the use of fossil fuels. The transportation of the metal that VEV uses as raw material also uses energy. However, while exact numbers are not available, it is probable that local production of the windmills results in less overall energy consumption compared to importing the parts from



abroad. The only waste produced from the production process is scrap metal which is either reused or sold to scrap metal dealers.

## Lessons Learned

Michel and his team have shown that there is a real niche market in wind pump repairs in Senegal through the continued existence of VEV over the last 15 years. While their profit has grown, they remain a small business somewhat reliant on externally donor funded projects to fund the purchasing of new wind water pump systems. With this experience, Michel has begun to realize that VEV needs to become more visible in the market. To this end, he is looking into new possibilities, such as increasing their presence in the northern rice farming areas along the Senegal River, where the potential for selling new wind pumps to irrigate rice fields exists. Rice farming is very important for Senegal's future food security and a potential growth sector. Going forward with this approach, VEV will need to really work on creating a marketing strategy, something they have not had to do in the past.

Also, VEV will need to find additional sources of loan financing. VEV already has a history working within the AREED project and has a good working relationship with ENDA, but will need to look beyond these sources for future loans. VEV may have opportunities to write up proposals to win bids with either government or NGO wind pump initiatives in the future.

One of the problems VEV will face when expanding into the northern Senegalese market for wind pumps is that ALIZÉS has already given away free water pumps in Senegal. This may cause a disincentive for communities to purchase their own pump because they may think if they wait long enough they will get one for free. At the same time, the new free pumps are donor funded and they may be interested in paying VEV to install new pumps.

Another lesson learned is that up until now, VEV has worked with NGOs who focused efforts on creating an effective water management structure. If VEV begins to expand into new installations, it will need to ensure that either VEV or a partner ensure that the essential water management committee structure is put in place. The management structure is an essential piece to ensure the proper management of the water funds and helps to ensure the ability to pay for maintenance and repairs now and in the future. VEV will need to assess if it thinks it can build the internal capacity to do this or if perhaps they can collaborate with an NGO that is interested in working specifically on water management issues.

Another possible future opportunity for VEV is diversification of products. ALIZÉS has been installing not only wind pumps, but also solar pumps. A number of communities where VEV is already working mentioned that they would like hybrid diesel/wind or solar/wind systems so that their pumps would work even when there was minimal wind flow. Even VEV's technicians identified solar water pumps as an area that they would like to learn more about and have technical trainings on. Michel will have to seriously look at VEV to see if the expansion into other types of water pumps makes sense for the enterprise or if it is better to remain specialized.



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January 2010

The information presented in this case study has been reviewed and signed-off by the company to ensure its accuracy. The views expressed in the case study are the ones of the author and do not necessarily reflect those of the UN, UNDP or their Member States.

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Design: Suazion, Inc. (NJ, USA)

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