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CASE STUDY

North Africa • Morocco

PROMASOL: Democratizing Access to Solar Water-Heaters

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Sector • Solar Power

Enterprise Class • Government Initiative



Executive Summary

For a country like Morocco with 3,000 hours of sun per year (5.5 kwh/m²/day), depending completely on imports for its energy needs seems like a paradox. Having recourse to solar energy entails many unquestionable benefits at economic, environmental and social levels as well as reducing the burdensome energy bill and reallocating the country's limited resources towards developmental and social projects.

Being aware of such a situation, Moroccan authorities strived to benefit from renewable sources of energy to produce at least 10% of the country's energy needs by 2010. Within this framework, the Moroccan Ministry of Energy and Mines (MEM) launched PROMASOL in 2002 to promote the market of Solar Water-Heaters (SWHs) in Morocco through quality improvement and certification, awareness raising campaigns, and training and certification of qualified solar water-heaters installers. The program management was entrusted to the Center for Development of Renewable Energies (CDER) under the supervision of the MEM.

Such an ambitious program could not succeed without the combined efforts of many international and local partners who contributed resources to implement it, provided technical assistance to, and/or participated in its activities in the field. Indeed, thanks to the active contribution of some partners such as the UNDP, the French Global Environment Facility (FGEF),¹ the Autonomous Government of Andalusia, and the Italian Ministry of Environment, PROMASOL has had definite impacts that have gone far beyond the mere objective of contributing to the reduction of the country's dependency on fossil fuels.

At the environmental level, PROMASOL has managed to curb about 1.3 million tons of carbon dioxide (CO₂) emissions since its inception in 2002. It is also expected to reduce about 920,000 tons of CO₂ per year until 2020. With regard to its economic impacts, PROMASOL has increased the number of SWHs from about 35,000 m² of solar panels in 1998 to more than 240,000 m² in 2008, and the number of companies importing and/or manufacturing SWHs from about five to more than 40. In terms of its social results, the program has contributed to the creation of hundreds of jobs directly through the training and certification of installers, and indirectly through the creation and/or expansion of specialized companies. It is also expected to create about 13,000 new jobs by 2020. In addition to job creation, PROMASOL has had a very positive impact on helping the poor through lending support to charity organizations.

¹ The French acronym of FGEF is FFEM (Fonds Français pour l'Environnement Mondial). It "is a bilateral fund which was set up in 1994 by the French government following the Rio Summit. Its aim is to promote protection of the global environment in developing and transitional countries." <http://www.ffem.fr/> [November 28, 2009]



Introduction

“It is unthinkable that a [sunny] country like Morocco does not use solar energy.”

Mohamed Berdaï, Director for International Cooperation (CDER)

Morocco is unquestionably a very sunny country. Paradoxically, it is one of the most dependent on imports with about 97% of its energy needs being covered by fossil fuel-based energy imports. Such a paradox can be explained in particular by the previously unaffordable cost of solar equipment, and by the lack of local expertise in this field. In addition, it was almost taken for granted that renewable sources of energy in general cannot be a real alternative to fossil energy in terms of power, sustainability, and convenience. More often than not, such a perception is strengthened by the regulatory framework that makes it compulsory for all urban accommodations to be connected to electricity, whereas equipment with solar systems has largely been perceived as luxury. As a consequence, Morocco had only about 35,000 m² of solar panels throughout the country until a few years before the PROMASOL program started in 2002.²

PROMASOL is one of the national programs aiming at addressing the pressing necessity to reduce the country's dependency on imported fossil energy within the national strategic objective to produce at least 10% of the country's energy needs from renewable energy sources by 2010. By the same token, it seeks to promote a culture of using solar energy for as many specific needs as possible. Therefore, it complements other programs such as the solar component of Global Rural Electrification Program, consisting of providing electricity to remote rural households through photovoltaic systems as managed by the National Electricity Office (ONE).

In this regard, the objective assigned to the program was to increase the number of solar panels to 100,000 m² by 2008. By the end of 2008, this objective was largely exceeded as the number rocketed to 240,000 m². Despite this prowess, the potential of the market is still very important. Some specialists talk of no less than 1,700,000 m² to be installed by 2020.³

Beyond the above-mentioned national objectives, the program entails positive impacts at the micro-economic as well as at the environmental and social levels, as we will see in the following sections.

² PROMASOL (2009). Rapport final – L'énergie du soleil, un choix tout naturel.

³ CDER (2009). Promasol – L'énergie du soleil, un choix tout naturel, page 5.



Market and Location Context

Morocco imports up to 97% of the energy it needs for its industry and domestic consumption.⁴ Hence, the energy invoice siphons a large part of the country's budget and puts it in a situation of almost total dependency vis-à-vis the world energy market and its sharp and frequent fluctuations. Paradoxically, the country is one of the most endowed countries in terms of renewable sources of energy. In his speech on July 30, 2008 (Throne day), King Mohamed VI of Morocco, said:

“Morocco has no other choice but to locally strengthen its capacity to produce energy and to encourage promising investments with regard to supplying energy. It must also pursue its efforts aiming at making alternative and renewable sources of energy, the keystone of [its] national policy of energy.”

Indeed, Morocco is one of the sunniest countries in the world with 3,000 hours of sun per year (5.5 kWh/m²/day). As Mr. M. Acharaani, the regional technical director at the Moroccan electricity utility puts it: “We've got the sun ... we should use it!”⁵ To benefit from this free and abundant resource, Morocco has undertaken many programs in collaboration with international organizations such as the United Nations Development Programme (UNDP) and French Global Environment Facility (FGEF) as well as with local NGOs and the private sector. One of these ambitious programs is PROMASOL.

PROMASOL stands for *PRO*gramme national de développement du *MAR*ché de chauffe-eau *SOL*aire or Development of the National Market for Solar Water-Heaters. It started in 2002 and aims at “changing [people's] perception about the use of the solar water-heater and its contribution within the framework of a new approach to energy integrating renewable energies, and creating energy efficiency.”⁶

With regard to solar resources, the Moroccan market presents a huge but almost untapped potential. The equipment rate of solar panels in Morocco is only 5.3 m² per 1,000 inhabitants whereas it rises to 16.6 in Tunisia, 83 in Jordan, 110.2 in Turkey, and 115.2 in Germany. Nevertheless, due to the abundance of sun in Morocco, a solar water-heater (SWH) produces up to two times as much energy as in Germany.⁷

In addition to contributing to the reduction of the country's dependency on imported fossil fuel-based energy, PROMASOL targets another related objective, which is the creation of a culture of using Solar Water-Heaters (SWHs). Achieving such an objective means making the solar water-heating alternative progressively accessible to low-income populations given the

⁴ Ibid, p. 4

⁵ Cited by John Laerson in “Morocco: World-Leading Solar Energy Nation”. Deutsche Welle / DW – World. De (2004). http://en.gantara.de/webcom/show_article.php?wc_c=478&wc_id=125. Article accessed on August 16, 2009.

⁶ CDER (2009). Promasol – L'énergie du soleil, un choix tout naturel, page 5.

⁷ Idem., p. 5.



effect of economies of scale permitted by mass production and imports. The public involvement in the program may also imply a more conducive regulatory environment to encourage the use of SWH by low-income populations mainly through tax incentives. In addition to these benefits, expanding the use of solar water-heating also means much less greenhouse gas emissions, creation of more jobs, as well as providing more comfort in areas where access to a fossil fuel-based energy is limited or absent.

Description of the Business Model

PROMASOL is a key component of a comprehensive program initiated in 1997 involving UNDP and the Moroccan ministries of Agriculture, Environment, and Energy and Mines with a view to preserving environment, strengthening sustainable development, and promoting renewable energies. In this context, PROMASOL was assigned the mission of promoting the SWHs market in Morocco while other programs have been striving for implementing solar-energy-based solutions in other fields such as *hammams* heating (traditional steam rooms) and rural electrification through photovoltaic systems.

PROMASOL was created after a funding agreement was signed in 2001 between the Moroccan Ministry of Energy and Mines (MEM), and UNDP. Its management was entrusted to the Centre de Développement des Énergies Renouvelables (CDER - Center for Development of Renewable Energies) within the framework of cooperation between the MEM, the FGEF, the UNDP, and other partners. Its cost, which amounted to US\$43,270,000, was covered by various partners as shown in Table 1.

Table 1: Breakdown of the Program Costs (2002-2008)

Cost and Funding	
FGEF	2,965,000
Co-funding	
CDER	250,000
UNDP	250,000
Government of Andalusia	400,000
National electricity office (ONE)	350,000
MOR/97/004 (UNDP-funded project on environment protection and natural resources management-Energy Section 1998-2004)	500,000
Joint funding pertaining to equipment of public and private sectors	
Contributions in kind⁸ (By CDER and the MEM)	38,155,000
Local distributors	250,000
	100,000
Total cost of the program	US\$43,270,000

Source: CDER. "PROMASOL – Rapport final – L'énergie solaire, un choix tout naturel", Rabat, p. 6.

⁸ Such as the premises allocated to the program.



VALUE CHAIN CREATION

Supply of Solar Water-Heaters

On the supply side, and before PROMASOL started, there were only about five SWH importers and supposedly no local manufacturers in the whole country. As the program could not promote the SWH market with such a limited supply capacity, in 2005 it created a financial support mechanism known as ‘Solar Industry Accompaniment’⁹ (SIA). This tool is meant to financially help industrialists with investment projects related to the local manufacturing of SWHs. The support is twofold: first, with regard to the investment part, PROMASOL covers 20% of all expenses related to the equipment purchasing and installation; second, it pays back up to 80% of all expenses pertaining to the organization and certification of the manufacturing process.

Three local SWH producers benefited from this initial support, namely, Atcoma, Capsolair, and First Metal and, at least two new plants for manufacturing SWH were created. Three other companies were eventually added to the first three: Phototherme, Spolyten and Sococharbo.

Just about one year after this support got initiated; all beneficiaries were able to significantly increase their sales of SWH: Atcoma (15.5%); Capsolair (22%); Phototherme and Sococharbo (13%), and Spolyten (108%).¹⁰ All certified brands can be seen below in Table 2.

Table 2: SWH Certification by PROMASOL

Company	Certified Brand	Certified Margin
Atcoma	Gioca 150 liters	75 to 225 liters
Capsolair	Capsolair 200 liters	100 to 300 liters
Phototherme	Giordano 300 liters	150 to 450 liters
Sococharbo	Solahart 300 liters	150 to 450 liters
Spolyten	Olympic Sun 200 liters	100 to 300 liters
Immosolar	Edwards 300 liters	150 to 450 liters
BP Solar	BP Solar 200 liters	100 to 300 liters
Noor Web	Dimas Solar 200 liters	100 to 300 liters
First Metal	Imperial 150 liters	75 to 225 liters
Megasun	Elecmar 200 liters	100 to 300 liters
Energy Pole	Energy 300 liters low pressure	150 to 450 liters

⁹ In French, “Accompagnement à l’Industrie Solaire” or AIS.

¹⁰ No data is available with regard to First Metal



Myfak	Thermosun 300 liters	150 to 450 liters
Chaffotaux	Chaffotaux 300 liters	150 to 450 liters



Companies wishing to have their SWH certified by PROMASOL have their products tested at the CDER's facility in Marrakesh

However, it was clear to PROMASOL's experts that the local manufacturing process was poorly designed, in particular for the solar tanks. It was then necessary to add a technical assistance component to the program to help local companies improve their manufacturing process and, consequently, the quality of their products.

Moreover, two laboratories were created in Marrakesh at the CDER's facility to test the quality of SWH either locally manufactured or imported.

A quality label featured by an advertising sticker commonly known as the 'macaron' was designed to prove the compliance of the SWH with the CDER's quality standards.

To have its SWH certified, a company must formally apply for the CDER's certification. Following this application, a group of experts visits the company and chooses among an inventory of at least 41 SWH, a sample of products that will be tested in one of the two laboratories of the CDER. If the company's SWH pass the test, they are certified compliant with the relevant Moroccan norm, and a certification sticker is put on them. As of 2009, 13 brands of SWH have been certified and received the 'macaron'.



Certified SWH logo or 'macaron'

Certification by the CDER is not yet compulsory and the non-certified companies can still sell their SWH be they imported or locally manufactured on the market. However, having the certification guarantees the product quality and respect of safety standards and may be used by the company as leverage to increase its sales. Moreover, a new regulation will be implemented shortly to make such certification mandatory for all SWHs.

Distribution and Marketing

At the distribution level, PROMASOL launched a financial support mechanism called 'Commercial Partnership Insurance' (CPI).¹¹ Its aim was to foster commercial partnerships between a supplying company and one or more distributors. In this respect, the CPI insures up

¹¹ In French, "Assurance Partenariat Commercial" or APC.



to 80% of the commercial risks incurred by the parties such as late payment, non-payment and bankruptcy of the buyer. Eligible expenses also include training and certification of installers.

A series of TV, radio, and newspaper advertisements were also initiated by the program with a view to enhance people's awareness with regard to using solar heating and to emphasize the benefits of using such a cost-effective, safe, and environmentally-friendly solution. Other communication means were also used to the same end, including seminars, events sponsoring, etc.

For marketing SWHs, PROMASOL targeted three types of customers: institutional customers such as ministries and their dependencies; industrials and private companies (mainly hotels and private hospitals); and finally, individuals wishing to equip their homes with SWH.

With regard to institutional customers, agreements were signed between PROMASOL and several ministries such as the Ministry of Health, the Ministry of Housing, the Ministry of Tourism and the Ministry of National Education to promote the use of solar water-heating in their facilities as well as in their dependencies: public hospitals, public schools, hotels, etc. In this respect, a recent decree of the Moroccan Prime Minister makes it compulsory for public organizations and administrations to give precedence to the use of renewable sources of energy including solar water-heating where needed.

As for industry and private businesses, the leasing formula was preferred by PROMASOL to encourage access to SWH. As a result, a financial tool known as FOGEEER was created and endowed with a budget of about US\$1.3 million. It guarantees up to 70% of the cost of solar equipment funded by leasing companies.

Currently no direct financial support is available for individuals, but the increasing availability of SWH exerts a pressure on their prices that have been dropping from about US\$1,700 before the program started to about US\$650 nowadays. In addition, the reduction of the value-added tax (VAT) rate by the government from 20% to 14% contributed to making SWH affordable for a larger proportion of population.

Installation and After-Sales-Service

The installation level closes the value chain and, at the same time, highlights the inclusive dimension of the program. Given the complexity and the newness of the product, it takes qualified professionals to install SWH. Therefore, a new profession progressively emerged, namely, SWH certified installers.

Those who go for the certification will benefit from a thorough training offered by PROMASOL in partnership with distributors. Trainers are paid by distributors who participate with PROMASOL in the selection of the trainees on the basis of their previous experience as plumbers, electricians or others with hands-on skills. Once the training is completed, installers take a theoretical and a practical test before an examination committee



Certified installer logo

representing PROMASOL, the CDER and the solar industry. The practical test consists of installing a SWH according to the standards. Successful candidates must also be able to precisely measure and adjust the declination of solar panels to receive the certification.

The training and certification costs paid by distributors on behalf of their installers are eligible to be covered for up to 80% by the CPI mechanism. The remaining 20% may be covered by the distributor or the installers themselves.

“We wanted to formalize the relationship between distributors and installers to make things as clear as possible. That is why we created a specific program of insurance aiming at reimbursing commercial and technical training expenses that distributors pay in this respect.”

Mohamed Berdaï, Director for International Cooperation (CDER)

Fostering the Value Chain

PROMASOL went beyond creating the value chain to fostering it through a promotional operation. In this regard, the program bought a total of 1,000 SWHs from the companies that initially benefitted from the financial support of PROMASOL (SIA). These SWHs were paid by PROMASOL but kept at the distributors’ warehouses. It was at that time PROMASOL launched its commercial campaign in television, radio and newspapers.

Interested customers are encouraged to contact the program in Rabat and express their wish to buy a discounted SWH. As long as there are SWHs left, the program issues a coupon to the applicant who should present it to one of the selected distributors to have the SWH delivered and installed.¹² As a not-for-profit program, PROMASOL did not intend to make any profit from this operation. Table 1 shows the breakdown of the program costs and how they were covered above on page 5. SWHs were sold at their purchasing cost of 5,000 Moroccan Dirham (MAD) (about US\$650) paid by the customer to PROMASOL through the distributor. In addition, an installation fee of MAD 1,000 (about US\$130) is paid by the customer to the certified installer.

The advantage for customers is twofold: First, they buy their SWH at a discounted cost of MAD 5,000 versus a market price of MAD 8,000 (about US\$1,040) to MAD 10,000 (about US\$1,300) permitted by the negotiating power of PROMASOL; second, they have the total confidence of buying a quality SWH installed by a certified installer. However, and despite these advantages, only institutions and middle-income class in urban areas could afford to pay US\$650, which represents about six times the cost of a non-solar water-heater. Nevertheless, the operation was very successful and the 1,000 SWHs were very quickly sold. Many customers did not take long to understand that even if SWHs are more expensive than non-

¹² Selected companies are those benefitting from the CPI mechanism (see page 7)



solar ones, they would save in the long run since the solar energy is free whereas they had to pay for propane gas to use their former water-heaters. Indeed, the savings made by using a SWH make it possible to amortize its purchasing price over a period of only three years.

In addition to satisfied customers, two other actors have received benefit from this promotional operation, namely, distributors who sold 1,000 SWHs over a short period of time, and certified installers who installed them. As a matter of fact, this induced the creation of many new jobs as we will see in the Results section.

As for PROMASOL, the gain was that the market was created and the value chain seemed to have significantly improved as initially intended.

CONSTRAINTS AND SOLUTIONS

Since the start of PROMASOL in 2002 until 2008, the SWH coverage area in Morocco soared from about 50,000 m² to 240,000 m². Despite this unquestionable success, the program has been wrestling with some constraints that impede its further development.

First, it is not easy to change a long-lasting culture of using Propane Water-Heaters (PWHs). As the latter uses the same propane bottles as cookers, many people find it more convenient to use PWH, mainly because propane is subsidized by the government for more than 60% of its cost.¹³ To overcome the constraint of changing the water-heating culture, the CDER has been widely promoting SWHs by means of newspaper, radio and TV advertisements and awareness-raising campaigns.

Second, it is true that in the long run, SWHs turn out to cost much less than PWHs because the source of energy it uses is free and abundant. However, as mentioned before, the cost of a SWH is about six times higher than for a PWH. As a consequence, the poorest cannot really afford to buy it. Only a limited portion of the less poor may have enough resources to equip their houses with SWHs. To overcome this constraint, PROMASOL's management is looking into progressively reducing SWH prices through economies of scale permitted by mass production, and also by offering tax incentives. In this respect, the VAT rate on SWHs, already reduced by the government from 20% to 14%, is supposed to be brought down to only 7%. In addition, the possibility of subsidizing solar water-heating by the government is under consideration to make SWHs accessible to the poor.

Third, SWHs are very productive and satisfactory as long as the weather is sunny. During winter days, they provide insufficient quantities of heated water and customers may have to rely on other options to heat water. Fortunately enough, it does not rain a lot in Morocco and sun is paramount a large part of the year. In addition, the SWH quality is considerably improving and so are the possibilities of storing heated water for a longer period of time.

¹³ Some measures are being currently considered to restrict the subsidy of propane used for cooking. The government does not intentionally want to subsidize PWHs. But since the propane is primarily used for cooking, the government intends to support the poor by covering a large part of such a widely used product.



Beyond the program’s contribution to improving the people’s well-being for a lesser cost, value creation for the poor is primarily done through job creation. This occurs at two main levels. First, at the level of manufacturing, importing and distribution, SWH market expansion enables the creation of more jobs. Most of the people benefitting from these newly created jobs belong to the low-income class of the population and used to being unemployed.

Second, at the certified installers’ level, the quick expansion of the market created an unprecedented opportunity for many former craftsmen in the plumbing and electricity industries as well as for some unemployed people to become certified installers. Here also, most of the beneficiaries are believed to be low-income people.

In addition to creating jobs for installers, the program also has a positive impact on the many micro-enterprises called ‘Maisons-Énergies’ (Energy Houses) created within the framework of a related program managed by CDER in partnership with UNDP.¹⁴

The Business and its Relationships

The success of PROMASOL can be explained by many reasons including the need for the country to catch up with its direct competitors in terms of international competitiveness, through the reduction of its energy bill. However, PROMASOL would not have succeeded without the support provided by the program’s numerous partners. Indeed, many partners, both local and international, have a stake in this program in addition to the CDER in charge of its management. They can be sorted into four categories as shown in table 3.

Table 3: Partners in the PROMASOL program

Principal partners	Institutional partners	Commercial partners	Other partners
<ul style="list-style-type: none"> • MEM • UNDP • FGEF • Italian ministry of environment • ONE • Government of Andalusia • Association marocaine du solaire (AMISOLE) 	<ul style="list-style-type: none"> • Ministry of housing • Ministry of national education • Ministry of health • Office National des Œuvres Universitaires Sociales et Culturelles (ONOUSC) 	<ul style="list-style-type: none"> • ATCOMA • PHOTOTHERM • SOCOCHARBO • SPOLYTEN • FIRST METAL • NOOR WEB 	<ul style="list-style-type: none"> • SWH certified-installers • Maisons Énergie (Energy houses) • Leasing companies • Dar Addamane

¹⁴ Another GIM case study has been commissioned specifically on *Maison Énergie*.



Principal partners are those who first initiated the program, contributed resources to allow its formation; provided technical assistance to implement it, and/or take part in its management.

“The Government of Andalusia has participated in the program because they were interested primarily in its social aspects. Thanks to their support, we were able to install SWHs in schools and hospitals in rural areas in the North of the country. We could also start a fruitful relationship with the ministries of Education and Health.”

Mohamed Berdaï, Director for International Cooperation (CDER)

In addition to the funding members, this category also includes The Moroccan Association for Solar and Aeolian Industries (AMISOLE) created in 1987 and counting about 40 member-companies.¹⁵ AMISOLE, a founding member of PROMASOL, represents the industry vis-à-vis the program.

Institutional partners are the Moroccan ministries of Housing; National Education; and Health as well as the Office National des Œuvres Universitaires et Culturelles (ONOUSC) that signed partnership agreements with the program to promote SWHs in their respective fields of competence.

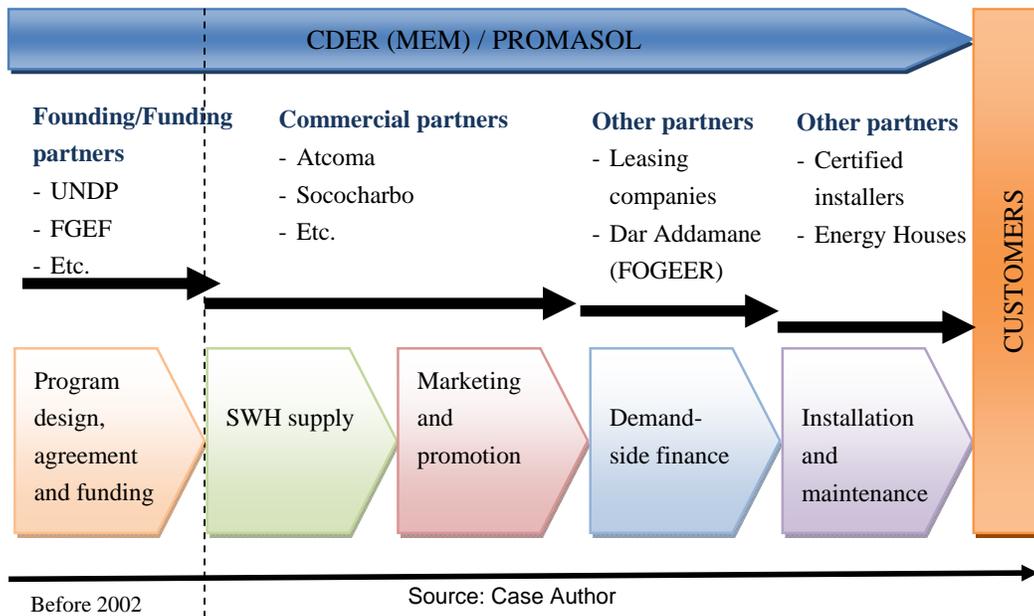
Commercial partners in this program are private companies that submitted a bid as a reaction to the calls of tender launched by the program in 2003 and 2004 to benefit from the Commercial Partnership Insurance (CPI) mechanism. Selected companies were declared eligible for the partial or total reimbursement of their expenses related to manufacturing and/or marketing SWHs. They were also entrusted with the mission of commercially and technically training professional installers, and developing commercial relationships with micro-enterprises and local entrepreneurs. In this respect, PROMASOL encourages its distributors to partner with these local micro-enterprises and support them to help ensure a high quality service.

Among other partners, professional installers and micro-enterprises are the actors that implement the program in the field. They are selected, trained and, certified by commercial partners and the CDER as being competent in installing, maintaining, and repairing SWH. This category also includes leasing companies that finance SWH equipment bought by industrialists and businesses: hotels, hospitals, companies, etc. Mr. Dar Ad-Damane in charge of managing Fonds de Garantie des Efficacités et Energies Renouvelables (FOGEER), provides its guarantee to leasing companies. Figure 1 shows the positioning of each category of partners with regard to the value chain.

¹⁵ www.amisole.com [December, 12, 2009]



Figure 1: Actors involved in PROMASOL



As in similar development programs, most of the principal partners and, in particular, the international or foreign ones who participated in the foundation and/or the initial funding of the program, have progressively lost their precedence to national partners. Thus, commercial partners as the SWH ‘labeled’ distributors, and the certified installers have become the most important actors in addition to the customers.

Heterogeneity of these actors as well as their diverging interests makes it very complicated and time-consuming to coordinate their relationships. That is why the CDER focuses its coordination efforts on its commercial partners and entrusts them with the mission of coordinating certified installers and energy houses. In this respect, the CDER requires its commercial partners to report monthly the volume of their sales of SWHs, their selling prices, the number of certificate stickers (macarons) acquired as well as the number of partnerships developed with micro-enterprises, certified installers, and local distributors.

“Our role is more a leadership role than a coordination one. We strive for expanding and regulating the market, we initiate and promote new standards of quality, and we also try to facilitate relationships between distributors and installers.”

Mohamed Berdaï, Director for International Cooperation (CDER)



Results Created by the Business

As previously mentioned, the primary objective of PROMASOL was to create a culture of using SWHs. Social, economic, and environmental objectives were not specifically targeted. Nevertheless, the results achieved in these three areas are significant.

ECONOMIC IMPACT

As for economic results, the market expansion made it possible for all suppliers/distributors involved in the program to achieve high levels of profitability varying between 13% in the case of Phototherme and Sococharbo (70% in the second phase of the program starting in 2004), and 108% as in the case of Spolyten.¹⁶ Selling more SWHs than they used to, even with lower profit margins contributed to boosting the overall profitability of these businesses.

The surface equipped with SWH panels in Morocco has increased from 35,000 m² in 1998 and about 50,000 m² in early 2002, to 240,000 m² in 2008. It is noteworthy that the objective that was set when the program started was only 100,000 m² by 2008.¹⁷ However, no data is available to assess how much fossil energy was spared as a result of PROMASOL, but nobody denies that the impact in this respect has been quite significant. Moreover, such an important increase in SWH panels has had a very positive impact on job creation as we will see later in this section.

“When the program started in 2002, there were about five companies specializing in importing SWH in the whole country. In 2009, they are about 40 companies including 13 companies whose products are certified by PROMASOL. This definitely means many hundreds of jobs created ... I estimate the potential of creating new jobs at about 13,000 by 2020.”

Mohamed Berdaï, Director for International Cooperation (CDER)

SOCIAL AND ENVIRONMENTAL IMPACT

At the environmental level, CO₂ gas emissions have been reduced by 1.3 million tons according to the CDER.¹⁸ PROMASOL has not yet applied to the Kyoto Protocol Clean Development Mechanism (CDM) to sell its carbon credits, but plans to do so in the future.

At the social level, impacts are quite significant. First, the program has contributed to the creation of hundreds of new jobs at all levels (shop-floor workers, drivers, technicians, etc.) Second, many new distributors of SWHs, including more than 300 micro-enterprises known

¹⁶ PROMASOL (2009). Rapport final – L'énergie du soleil, un choix tout naturel, page 8.

¹⁷ Idem., p.4.

¹⁸ Excerpted from an email exchange with Ms. Nadia Alabouche, in charge of PROMASOL at the CDER.



as ‘Maisons Énergies’, have been established in all regions of the country to make SWHs accessible to customers. More than 200 SWH installers have been certified by the program.¹⁹ Given the expansion rate of the market, more certified installers are needed. That is why the program is decentralizing its training activities to many regions of the country.

“The fast expansion of the SWH market raises the need for more well trained installers. In this respect, we have launched a program to select, train, and certify installers. We have even started signing maintenance contracts with them, which creates for them more opportunities for work. This is one of the most important social impacts of this program.”

Mohamed Berdaï, Director for International Cooperation (CDER)

Moreover, social impact of the program was also important in terms of support to charitable organizations as can be seen from table 4.

Table 4: Support to charitable organizations

Location	Number of residents	Capacity (in liters)	Area (in m2)	Produced energy (in Kwh/year)	Cost (in MAD)
Centre de rééducation des handicapés	200	8,000	121	84,700	508,200
Ouaouizerth	90	1,200	14	9,800	58,800
BeniMellal	288	3,600	58	40,600	243,600
Marrakesh	280	3,200	40	28,000	168,000
Kenitra	200	4,000	54	37,800	226,800
Nador	130	750	26	18,200	109,200
Taourirt	80	450	10	7,000	42,000
Temara	120	2,000	32	22,400	134,400
Larache	124	2,550	34	23,800	142,800
Assila	50	600	4	2,800	16,800
Tetouan	150	1,950	26	18,200	109,200
Dar TalibNassim	200	5,700	76	53,200	319,200
AMB SidiBernoussi	200	4,500	62	43,400	260,400
Al Hoceima	150	1,500	24	16,800	100,800
Taza	250	1,500	32	22,400	134,400
Chefchaouen	120	1,500	21.6	15,120	90,720
Tangiers	600	4,950	64	44,800	268,800
Total	4,782	38,700	636.6	665,420	2,934,120

¹⁹ Idem



In this respect and in cooperation with the Ministry of Social Development, Family and Solidarity, the program has offered free SWH service to 17 such charitable organizations accommodating almost 5,000 residents and patients among them a large proportion of poor students. The beneficiary organizations are proposed by the National Support Service (Entraide Nationale) and selected by a joint committee (PROMASOL-National Support Service) after a site visit.

OTHER IMPACTS

At the regulatory level, many measures have been taken towards strengthening the market of SWHs. The Prime Minister's letter to all public administrations to integrate solar energy into their projects has undoubtedly triggered a real momentum in this respect. Moreover, to improve the quality of SWHs, a set of standards and technical specifications has been designed, as well as a definition of key qualifications certified installers must have such as being able to precisely measure and adjust the declination of solar panels. It is also noteworthy that the VAT rate has been reduced by the government Tax Administration following a recommendation by the CDER and the MEM from 20% to 14% to make SWH more affordable.

Thanks to all these measures, six new brands of SWHs have appeared on the market in 2008 for a total of 17 brands marketed by about 40 companies. Thirteen among these brands of SWHs have obtained the CDER's certification. As previously explained, it is not yet mandatory for companies to have this certification to sell their SWHs on the market. However, as customers are more educated and knowledgeable about SWHs, they tend to become more demanding with regard to the quality of the SWHs they buy.

Growth Strategy and Future Outlook

In addition to the letter of the Prime Minister to all public administrations with a view to integrating renewable sources of energy and in particular SWHs in all their programs when relevant, bilateral agreements have been signed between the Ministry of Energy and Mines (MEM) and other ministries to this effect. For instance, the Ministry of Housing is supposedly about to make it compulsory for all housing programs, private and public, to equip new houses with SWHs. Beyond the benefits for the country, such a decision would create more jobs for certified installers.

“We want to go from 50,000 m² per year to 200,000 m² per year as of 2012. To do that, we should subsidize SWH. Until now, the only financial incentive consists of the reduction of the VAT rate from 20% to 14%. This also should go down to 7%.”

Mohamed Berdaï, Director for International Cooperation (CDER)



On the basis of its projections for the period ending in 2020, CDER's management estimates a reduction of CO₂ gas by 920,000 tons per year. In the same time period, solar energy to be produced is projected at 1,190 GWh.

In terms of job creation, the program is expected to directly create 920 permanent jobs per year until 2020 in addition to the 12,000 to 13,000 indirect jobs for the whole market of SWHs.

To further promote the market of SWHs and enhance its positive impacts at the economic, environmental, and social levels, a long way remains to go.

“Definitely, we have to do much more. One of the major actions to take is to make SWH accessible to the poor. In this respect, we should strive for producing a low-cost local SWH.”

Mohamed Berdaï, Director for International Cooperation (CDER)

Nevertheless, a recent survey has shown that 94% of customers find current prices of SWHs fair.²⁰ It is noteworthy however, that the customers currently targeted are mostly middle class. Consequently, an effort has to be made to target the poor as well through reducing the price of SWHs. In addition to lowering the production cost of these SWHs, two other measures are being considered by the program, namely, reducing the VAT rate further and finding new ways to giving access to funding mechanisms to the poor. Providing subsidies is definitely one of such mechanisms that may be implemented in the second part of the program known as PROMASOL 2.

“Within the framework of PROMASOL 2, we primarily intend to implement many actions agreed upon with our institutional partners. For instance, with the Ministry of Housing, we have agreed to install one million of square metres of panels by 2020. PROMASOL 1 has shown the huge potential of the market. We have now to go further through increasing people's awareness vis-à-vis solar energy, implementing quality standards, and democratizing access to SWH.”

Mohamed Berdaï, Director for International Cooperation (CDER)

²⁰ PROMASOL (2009). Rapport final – L'énergie du soleil, un choix tout naturel, page 18.



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Growing Inclusive Markets

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The case was completed in February 2010 and released in 2011.

The information presented in this case study has been reviewed 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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