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Understanding stakeholders' views and support for solar energy in Brazil

Fabián Echegaray*,[1]

Rua Felix Kleis, 23, Florianópolis, SC 88035330, Brazil

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ABSTRACT

Successful development of renewable energy technologies like solar photovoltaic energy (SPV) critically relies on its understanding and acceptance by consumers and institutional customers. Even in contexts of favorable support at the general level like in Brazil, their implementation faces multiple challenges, including low awareness, misperceptions, insufficient communication, and eco-labels' mixed record as information enhancing tools.

This paper discusses how market research has been instrumental in developing the first SPV venture in Brazil, by identifying public's beliefs and level of support for alternative energies, and by testing reactions to a solar energy eco-label scheme proposed as key communication tool.

The study indicates that expectations for return on investment are affected by a sustainability penalty, as well as by price and adaptation barriers. It also reveals an assessment gap between the concept and design of eco-label, which led to a new eco-label design capable of better addressing unfavorable beliefs, integrating expectations, and improving overall acceptance.

1. Introduction

"Solar energy is the future of energy." Few remarks could bring together disparate players like Greenpeace and IAE behind a common issue (Greenpeace, 2010; Kirkland, 2010). Seemingly, the immense potential of solar photovoltaic (SPV) technology to address our energy problems affords a rare opportunity to coalesce two groups: those rallying around social and environmental interests and those acting based on mainstream business principles. After all, if solar energy is indeed the future of energy, then it is also the future of our economy.

To be sure, the combination of growing economic pressures—resulting from current energy shortages and price instability—and mounting environmental pressures places energy issues at the forefront of the public agenda, impelling countries and companies to move toward greater eco-efficiency and a cleaner and fully renewable energy matrix (Alam et al., 1991; Brown, 2009; Pasternak, 2000; Stern, 2011). In the specific case of photovoltaic energy, scholarship acknowledges strong prospects for growth (Jacobsson and Johnson, 2000; Raugei and Frankl, 2009).

If this is true for all nations, it seems all the more relevant for Brazil. Numerous factors converge to make Brazil an ideal site for solar energy production (EPIA, 2010; IEA, 2010), including a large proportion of sunny days, optimal radiation intensity, and a large geographic area with these favorable conditions.[2] Concurrently, solar equipment installation costs are rapidly decreasing[3] while the costs for externalities from using conventional sources (i.e., large-scale hydropower plants like Belo Monte or pre-salt layer oil exploration) continue to increase.[4] However, as of mid-2012, Brazil had only a small SPV base (50 MW, 99% off-grid) and no national programs supporting it (EPIA, 2012). At this time, there are only four central solar energy generators and this source of power was excluded from the energy regulation agency's (ANEEL) 2030 National Energy Plan.

* Tel.: +55 48 3364 0000.
E-mail addresses: fabian@marketanalysis.com.br, fabian@floripa.com.br.

[1] The author works as managing director of Market Analysis, a market and opinion research agency based in Brazil. His research interests include ethical consumption, corporate responsibility, and sustainability issues.

[2] Incidence of solar radiation is estimated at 4500 to 6300 Wh/m^2, by the America do Sol network, 2011. http://www.americadosol.org/potencial-brasileiro/ (08/08/2012).

[3] According to 2011 calculations by Bloomberg New Energy Finance, costs are expected to decrease by half by 2013, pushed by a larger economy of scale with regards to producing components. Consequently, annual world manufacturing of equipment has quadrupled since 2008 and is expected to double by 2013, further reducing costs. Also, see Scheidt (2011).

[4] Costs for building the Belo Monte dam rose from R$ 16 billion in early 2010 to R$ 26 billion in late 2011, while, in November and December 2011, four oil spills were reported in relation to pre-salt layer oil exploration (Maden, 2012).

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Despite the failure of policy to assertively endorse alternative energies (hereafter, AEs), non-conventional sources of power find support in public opinion. Surveys with Brazilian consumers reveal concerns regarding the environmental footprint of both conventional and nuclear power (Portal Energia Hoje, 2011; Revista Brasil Energia, 2012). Further, both consumers and opinion makers within the business community are receptive to clean forms of energy and optimistic that wind and sun power will soon account for a larger portion of the energy matrix (CEBDS-Market Analysis, 2010).

This counterpoint serves as the research context for this study of Brazil's first large-scale public grid-connected SPV venture, the Megawatt Solar Project. This initiative was jointly designed by the Federal University of Santa Catarina (UFSC) and the Latin American Institute for AEs Development (Instituto IDEAL), which partnered with the German Agency for International Technical Cooperation (GIZ) for technical counseling and partial funding, and the electric power service provider of South Brazil (Eletrosul).

In 2010 the consortium began installing the first photovoltaic plant connected to Brazil's public grid and capable of generating 1.2 GWh per year over the medium term. The plan targets medium and large consumers as buyers with power acquisitions being traded in the free contract market of energy through public bids valid for 5 years. The business model relied on selling the SPV-generated power to twelve corporate customers, with each one paying a premium price to acquire 100 MWh per annum. The public bid held in late 2011 received 14 proposals.

Project success heavily depended upon proper understanding and substantial approval of the proposal by key stakeholders like corporate customers and regular consumers—issues ultimately unknown to the consortium parties. Concomitantly, in order to plan a communication strategy for those publics three questions required answers. Firstly, what is the level of informed awareness about AEs and how does it enable proper understanding and reasoning regarding energy issues? Secondly, where do favorable attitudes toward AEs originate from, and to what extent do they translate into intentions to change behaviors? Finally, how do enhanced information tools, such as eco-labels, succeed in making gains more visible and mobilizing stakeholders beyond acceptance of an idea, to committed sponsorship?

This study tackles these questions using the market research information that supported the strategy of the SPV endeavor in Brazil. We begin in Section 2 by reviewing the suppositions the consortium had about corporate customers and end-consumers awareness and reactions to new types of energy and of the potential of eco-labeling schemes to increase AEs' legitimacy. In doing so, we rely on findings discussed by the literature on these topics. In Section 3 we outline the methodological approach for data collection and analysis; this approach was shaped by the study's goal to inform policy and, thus, requires both a description of the opinion context and a focus on testing underlying assumptions of the SPV plan. Section 4 reviews consumers' and business's notions and beliefs about solar energy and examines the extent to which benefits can be credibly related to the SPV proposal. Section 5 focuses on the acceptance of eco-labeling and evaluates its efficacy as a communication instrument to bridge current attitudinal gaps. Finally, we synthesize lessons learned and their implications, given the ongoing policy context of mild and contradictory endorsement of AEs in Brazil.

2. The business case for solar energy: research agenda and literature review

The consortium business model was based on a number of suppositions that required empirical verification, thereby determining the scope of this study. The main supposition concerned the attractiveness of AEs, a belief supported by global trends of companies (Hanson, 2005) and consumers (Brannan et al., 2012). This attractiveness was expected to translate to an opportunity for sponsoring companies to capitalize on a distinctive sustainability credential as a basis for product differentiation and a tactic for market leadership (Hanson, 2005).

Instrumental to make visible such sustainability credential was the offering of an eco-label. The consortium understood that eco-labeling was key to successfully attracting corporate sponsors; given Megawatt Solar project's unique green qualifications, the offering of a pioneering third-party environmental labeling program was thought to persuade corporate sponsors effectively as a tool promising enhanced reputation and improved sales performance (Rubik and Frankl, 2005). But while this conjecture was crucial to the development of a successful business plan for Megawatt, many of the assumptions were untested when we began the study.

First, it was assumed that both business customers and end consumers would share a basic awareness and understanding about AEs in general, and SPV in particular—a tenet often challenged by academic literature, which acknowledges cognitive barriers as important deterrents to renewables diffusion (Jackson, 2005; Reddy and Painuly, 2004). Second, the consortium members assumed that customers stated degree of interest would equate with public confidence in and acceptance of solar energy as a power source. However, researchers found that the relationship was less linear than the Megawatt project authors had expected. While the coexistence of interest and skepticism in renewables is well-documented by academic research (Cass and Walker, 2009; Devine-Wright, 2007; Paliwal, 2012), evidence of renewables overcoming design and technological limitations has only begun to accumulate (Raugei and Frankl, 2009).

A third supposition held that consumer and corporate publics would equate the adoption of AEs to a clear exhibition of commitment to sustainability. Further, it was believed that corporate adoption would result in a reputational dividend, as contributing to the greening of the energy matrix by sponsoring the SPV project would be effectively and favorably perceived by consumers (Brannan et al., 2012).

Essential to the validation of this argument was the assumption that, for business, the cost-benefit analysis of securing reputation gains through adherence to the premium-price SPV initiative would not be dramatically outpaced by other means of enhancing the company's image as a sustainability player. Since higher costs are an acknowledged barrier to the diffusion of renewables (Reddy and Painuly, 2004; Scarpa and Willis, 2010; Verbruggen et al., 2010; Zoellner et al., 2008), the return on investment for adopting SPV became an important issue.

Finally, it was assumed that these publics would identify eco-labels as a symbol of commitment to environmental corporate responsibility, and that these publics would be sensitive to, and would embrace the value of, a tool like an SPV eco-label.

Eco-labels serve a pivotal function as information-enhancing mechanisms for both the product and the institution behind the product (Boström and Klintman, 2008; Teisl and Roe, 2005). Yet, eco-labeling's value has often been reduced to its ability to offset information asymmetries or credibility deficits (Dendler, 2012). This view overlooks the emotional and engaging features that these instruments must incorporate in order to ultimately reach their audience of consumers and managers (Rex and Baumann, 2007). Furthermore, evidence suggests that eco-labels resonate mostly with environmentally aware consumers (Leire and Thidell, 2005). This creates a potential disincentive for a company aspiring to enlarge its market presence by placing sustainability at the core of its strategy.