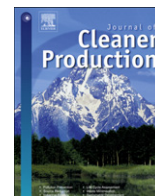


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Understanding stakeholders' views and support for solar energy in Brazil

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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.

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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 decreasing³ 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.

² Incidence of solar radiation is estimated at 4500 to 6300 Wh/m², by the America do Sol network, 2011. [http://www.americadosol.org/potencial-brasileiro/\(08/08/2012\)](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.

Our research plan pursued empirical evidence as well as market feedback surrounding all these assumptions. Through the research plan, we sought to gain understanding of (a) key stakeholders' views about solar energy, (b) the perceived benefits and costs of the proposed premium-priced SPV model, and (c) the reputation gains and marketing utility associated with exhibiting the eco-label. Additionally, our research would furnish us with participants' assessment of the eco-label design, which was thought to be the cornerstone of prospective partners' communication and sales efforts.⁵ The resulting research agenda addressed a number of questions critical to the larger goal of building successful cases for sustainable initiatives and policies: What cognitive and marketing barriers do consumers and corporate customers confront when embracing sustainable choices? How effective is an eco-label for identifying corporate subscribers to renewable energy and, therefore, conveying to their stakeholders their alignment with a sustainable business model? To what extent is an eco-label capable of breaking awareness barriers about solar energy and generating material benefits such as a better reputation? And how effectively did our clients' original prototype transmit the intended proposal to customers?

Existing scholarship on connected issues warns against simple and easy responses when it comes to understanding and affecting perceptions and actions about non-dominant energy choices like AEs. Research cautions against assuming that self-reported familiarity automatically translates to issue understanding (Lorenzoni et al., 2007). Similarly, academic work draws attention to the gap between favorable assessments and positive behavior responses in relation to sustainable consumer issues (Auger and Devinney, 2007)—a factor that seriously impairs the practical implications of issue attractiveness.

Further limiting AEs' adoption is the fact that key stakeholders in sustainable consumer and production decisions are heavily influenced by the desire for short-term benefits. Business managers need to secure profitability otherwise they may risk their careers. The average end-consumer, on the other hand, must conciliate between social pressure to consume in order to maintain personal identity, and the desire to use their limited consumer leverage to support sustainability choices like SPV energy. It is partially because of these factors that those who study behavioral techniques and attitude change management through social marketing and communication procedures (like eco-labeling) are often skeptical of these tools' ability to drive sustainable choices or influence the choice toward pro-environmental options (Webb, 2012).

3. Data and methods

Based on the research goals previously described, we proceeded with a two-phase methodology approach, involving the two specific publics targeted by the consortium—corporate decision-makers and end consumers.⁶ The study was fielded between mid-October and mid-December 2010. Phase 1 explored

consumers' views using a qualitative approach, based on 2 two-hour-long focus groups conducted in the city of São Paulo, each with eight adults aged 24–62 years old.⁷ Qualitative research is useful to uncover rationales and interpretations especially when studying objects or processes with low saliency in the public agenda or individuals' lives. It does not seek to attain results projectable to the entire population but rather it offers a window through which to understand how typical subjects think and assimilate of certain concepts or products. Therefore, this approach proved the most suitable to map out conceptualizations and prejudices about AEs, identify touch points upon which to build up a communication strategy with stakeholders, and feedback the consortium regarding the eco-label proposal.

Participants were recruited upon the condition of revealing a high level of interest in corporate socio-environmental responsibilities, yet with different levels of trust in the content of corporate communications on the matter. Thus, one group gathered typical consumers sensitive to sustainable issues and trusting corporate message on their actions, whereas the other group put together individuals attentive to corporate governance yet skeptical about the communications of companies. According to previous studies based on large sample surveys (CSR Monitor, 2005–2011), each group profile represented not less than 25% of the Brazilian population.

Phase 2 mapped out business managers' attitudes and intentions, using a semi-structured questionnaire, approximately 35 min in length, administered through a variation of the computer assisted telephone interviewing (CATI) to web technique.⁷ In total, sixty-eight managers were interviewed who worked for large companies that were free to choose their energy supply. These companies operate in a variety of market segments—from food industry to transportation, from civil construction to retail—across main cities in the southern, southeastern and northeastern regions of Brazil. Managers interviewed were evenly split in logistics/operations, marketing/communications, and sustainability areas.⁸ The majority of respondents had been employed in their positions for over a decade.

4. Understanding concepts and beliefs about solar energy: unlocking the support gap

Consumers most commonly think of AEs as involving solar power (which they equate to both thermal and SPV energy) and wind power. At a distant third place comes biogas—which includes a variety of biomass and biodiesel fuels, such as sugar-cane ethanol and waste and grass-generated fuel—followed by nuclear energy and tidal power. Business elites consider themselves familiar with AEs (18% very familiar, 59% fairly familiar) and exhibit a similar ranking of top-of-mind sources; while they are better able than consumers to distinguish between thermal solar and SPV power, many managers nonetheless confuse the two.

These concepts of AEs yield four implications. Among those sensitive to issues of sustainability, we observe

- a) an awareness of a plurality of sources and types of energy, even those not currently used or produced in Brazil;
- b) a recognition of forms of energy related and unrelated to one's daily life, indicating an awareness of both individual residential

⁵ The consortium held a bid for market research activities on these issues in mid-2010, which was won by Market Analysis, a market research agency based in Brazil. Data for this study were generously disclosed by all institutions involved.

⁶ The study could have been enriched by the opinions of other relevant influential publics such as government authorities and NGOs; however such influences were not explored in this study due to financial constraints. I would like to thank the anonymous reviewers for this observation.

⁷ This methodological approach is endorsed by extant scholarship on stakeholders' interpretation and perceptions of AEs (Legget and Finlay, 2001; Wustengahn, 2009). It also meets the need to explore issues that happen to be new or cognitively distant from subjects' realities as well as to capture the dynamics of reasoning behind responses (McNeil, 2005; Morgan, 1997).

⁸ This segmentation makes sense in terms of identifying the tensions between eco-efficiency arguments and reputational appeals in favor of the solar energy proposal. Furthermore, segmenting meets scholarship suggestions about considering the company as a heterogeneous agent whose positions require mapping out the opinions of the different internal decision-makers (Andrews, 1965).

- consumption needs (such as for heating and cooling, lighting, and fueling cars) and business and collective or large-scale needs (such as for manufacturing and transportation);
- c) a relative dissociation of hydro power from AEs (this contrasts with findings in other societies, see Curry et al., 2005); and
- d) a lack of differentiation between thermal and photovoltaic solar energy.

These relatively sophisticated opinions may offer a fertile environment for AE initiatives like SPV. Yet, the conceptual merging of different solar energies reveals a critical obstacle in showcasing the uniqueness and value of SPV.

Brazilian consumers respond to AEs, like solar photovoltaic, because they perceive that it is an available and accessible resource (“because it’s renewable and it has a free usage provided by nature,” consumer), which has minimal negative impact on the environment (“as far as I know, they do not harm nature,” consumer). Receptivity is also high among executives, who perceived of renewables as the most promising sources of energy in the near future: for example, wind power tops the awareness ranking (33%) and is considered the smartest among all clean energy options by 24% of managers. In the case of thermal solar energy, confidence is even higher, with 28% aware of the resource and 25% in favor of it (see Table 1).

Nevertheless, awareness and favorability confront a number of myths and misconceptions, thus creating a support gap between approval and actual mobilization in favor of these options. For example, some consumers believe that solar modules and wind turbines will occupy too much space and interfere with birds migrations (effects in conflict with the claim of being environment-friendly); that energy cannot be harvested on cloudy or windless days; that inconsistent winds or sunlight during a single day can zero the generation of power; that these solutions are unfit to satisfy the demands of large corporations, which are assumed to require “bolder” types of energy; or that claims of energy efficiency are ultimately weakened by limited or nonexistent storage capabilities. Interestingly, this so-called “sustainability penalty” partially mirrors what scholars have found in other contexts (Cass and Walker, 2009; Devine-Wright, 2007; Paliwal, 2012).

Misconceptions concerning solar energy start at the definitional level. Substantial numbers of consumers and managers conceptually merge SPV with thermal solar energy, and attribute electricity-generating capabilities to thermal collectors (“To my knowledge, solar energy is produced by the very same ray of solar light upon the plate,” consumer). This belief has some potentially adverse implications. For example, it suggest that, among sections of the general public, SPV might run the risk of being perceived as redundant, a possibility that may yield a devaluation of SPV

initiatives in the eyes of the average consumer, consequently reducing its attractiveness among company managers.

Consumers’ favorable attitudes for solar and wind power are based, in part, on these AEs’ minimal impact on the environment, a fact with troubling implications since it is based upon negative rationales (i.e., the minimization of negative outcomes), which are a far less effective motivator than positive arguments (i.e., benefits or expected returns). Such an opinion balance usually implies reactive behaviors.

Paradoxically, despite the difficulties encountered in converting awareness of renewable energies into knowledgeable understanding, consumers perceive themselves as agents of change, capable of influencing companies’ decisions. But this sense of influence (found in other studies as well, see CSR Monitor, 2005–2011) is unlikely to drive corporate decisions related to energy sources: according to managers, consumers’ voices ultimately function as a retrospective referendum on corporate choices, providing feedback on actions already taken. In other words, it is difficult to translate favorable public opinion toward sustainable choices like AEs into public pressure upon government or corporations to adopt these greener sources of power. We call this the support gap.

Business’s sympathy for renewables is influenced by a balance of positive and negative motives. They admit choosing AEs affords them a medium-to-long-term enhancement to their reputation (with 46% completely and 41% partially agreeing with this idea). While consumers are willing to grant this benefit, they believe such enhancements resonate more strongly with companies’ employees and current clients than with society at large. On the other hand, executives are divided as to the short-term, tangible benefits of walking the greener energy path: 51% agree that it is difficult for a large company to identify the immediate benefits of using an alternative source of energy, whereas 45% disagree (see Table 2).

In any case, the likelihood that these motivations will encourage SPV adoption is low, as this option remains below the radar of corporate executives. Only 5% of them spontaneously recall SPV as a form of renewable energy and the same percentage feel that this option would be of interest for the companies they work for.

While business leaders are less likely than consumers to hold misconceptions about AEs, there is nonetheless a degree of ambiguity behind their stated interest in and favorable response to AEs. This ambiguity takes three forms. First, the value allocated to AEs is not followed by actual adoption. Thus, within the companies surveyed, the comparison between percentage of importance that managers attribute to AEs and percentage who admit their companies have actually adopted AEs yields a gap of 30%. This gap is far greater than what managers report in relation to other sustainability-oriented decisions, like progressing toward product certification (16%) or water and energy consumption reduction (6%).

Table 1
Alternative energies: unprompted recall and perceived future success (business sample).

Recall ^a (%)		Perceived future success ^b (%)	
Wind power	33	Thermal solar	25
Thermal solar	28	Wind power	24
Hydro (standard)	14	Biomass	13
Biomass	10	Hydro (standard)	9
SPV	5	SPV	5
Other ^c	3	Biofuels	3
DK/NA	7	Other ^d	2
		DK/NA	19

^a Recall question: “When it comes to alternative electric power, which is the first type of energy that comes to mind?” (two responses allowed).

^b Success question: “Which type of alternative electric power would you say would be one of your main company choices in the future?” (two responses allowed).

^c Biodiesel, cogeneration, ethanol and small hydro.

^d Cogeneration and natural gas.

Table 2
Views about benefits of adopting alternative energies (in percent) (business sample).

Statements	Completely agree	Partially agree	Partially disagree	Completely disagree	DK/NA
Those companies pioneering the adoption of alternative energies will gain more prestige and market-share in the medium-to-long term.	46	41	9	4	0
It is difficult for a large company to identify the immediate benefits of using alternative energies.	25	26	16	29	3

Secondly, the notion that AEs are at the core of corporate sustainability policy platforms is often at odds with the reality: there is a disparity between managers' assertions that their companies have been implementing sustainable solutions and their companies' actual adoption of renewables. Finally, while the dominant rhetoric suggests that AEs are a must-have for companies, regardless of their higher costs (69% endorse this opinion) only 46% of managers identify the short-term paybacks of adopting renewables. In other words, while many executives believe that other companies should adopt AEs, they seem unwilling to follow this path and risk their own careers for what they ultimately see as uncertain or distant benefits.

Perceived higher costs of AEs, coupled with the premium price charged for SPV-generated electricity included in the Megawatt proposal, pose additional barriers for support among consumers and businessmen—a result that replicates findings from other societies (Reddy and Painuly, 2004; Scarpa and Willis, 2010; Verbruggen et al., 2010; Zoellner et al., 2008). When asked to identify the main challenges to wider usage of alternative sources of electric power, 51.3% of managers pointed to financial feasibility. The belief that going green in energy terms represents heavy costs with no economic payback seems the perfect recipe for stalling decisions. Given business managers' need to tailor actions to accommodate shareholders' desire for short-term satisfaction and profitability, the odds that managers will make a long-term, financially questionable decision are low and likely to affect only a minority (see Table 3).

Lastly, business managers recognize other challenges, external to market agents, which may impede the future of renewables. Such factors include greener energy supply availability and government regulations (see Table 3). Since large-scale availability is ultimately tied to government policy and incentives, the Brazilian state has a substantial role to play in the adoption of AEs.

Consumers reiterate this notion of government's responsibility as a key decision-maker: for some "the first step depends upon defining a government policy for renewables—I'm not talking about government putting money on these but determining the development of renewables as part of government policies." Other consumers express this expectation by drawing an analogy to environmental legislation: "Pretty much like you got environmental legislation forcing companies to deal with its waste in a responsible manner; you ought to get legislation that somehow puts the pressure on companies to use solar energy and to do it at accessible prices." Business's awareness of societal support for government regulation may, at some point, impel some industries to proactively adopt AEs; they may choose to self-regulate greener energy consumption before the state intervenes and forces them to do so.

Difficulties in aligning both corporate strategy and company infrastructure with a greener energy source mix, anchored on renewables, complete the set of obstacles identified by managers. These issues account for over 25% of the barriers and fall fully within market agents' responsibility. More importantly, their relative share of the total perceived obstacles suggests that political decisions within companies are weighted slightly heavier than technical matters.

All things considered, the message is clear: SPV power needs not only to become more visible to and better understood by

stakeholders, but it also needs to showcase its uniqueness and corporate functionality more clearly. Overcoming the barriers and misconceptions discussed requires better communication with and education of both publics, to improve chances of capitalizing generic favorable views into actual adoption of SPV by businesses. One significant barrier has to do with the financial feasibility of SPV for corporate clients, a fact that requires an improved funding and pricing proposition in the short-run but also an active dissemination of how costs are getting competitive in the medium and long-run.

At the same time, consumers and managers validate the belief that companies investing in AEs receive benefits in the form of an enhanced reputation; this encourages plans for tackling the unexplored SPV opportunities by focusing its marketing on an eco-label capable of identifying and, therefore, differentiating the corporations sponsoring the SPV development program. Promoting customer awareness by displaying the eco-label emerges, in theory, as a sound decision. The next section will explore how well this approach worked and what lessons were learned from testing this communication and marketing tool.

5. How do stakeholders react to the eco-labeling proposal for SPV energy?

Individuals' belief in their ability, as consumers, to influence corporate behavior corresponds with managers' belief that adopting sustainability policies improves a corporation's reputation and market returns; both these assumptions are necessary to generate a cycle that is favorable to the spread of renewable energies. Yet, these conditions are insufficient to propel such a cycle unless they function in tandem. A mechanism is necessary which informs consumers where best to exert their influence over firms and allows companies to raise visibility and augment their status by publicizing their decision to walk the renewable path.

The authors of the Megawatt project suspected that important cognitive and valuation barriers would impair their ability to attract the attention of companies concerned with sustainability (see also Bazerman, 2008). Consequently, the eco-label became pivotal to their efforts to raise awareness of SPV power. Successful international experiences with eco-labels and extant scholarship endorsing their utility seemed to support that choice (Boström and Klinton, 2008; Teisl and Roe, 2005). But, how instrumental and effective would this tool be, both in conceptual terms (i.e., raising awareness, securing visibility, improving the cognitive connection and comprehension of the SPV proposal) and in terms of achieving the desired effects (i.e., motivating interest or sponsorship commitments from firms, engaging consumer support for companies that use SPV energy)? Hence, assessing whether the tool was well aligned with the conceptual proposition of solar energy and whether the symbolic language used was effective were also matters to be empirically addressed.

Eco-labels are cognitive facilitation tools that act as information shortcuts. They are paramount in the case of Brazil, where surveys reveal that around 70% of consumers have difficulties, both in identifying ethical products and in understanding the socio-environmental benefits of products that claim to be sustainable (CEBDS-Market Analysis, 2010). Further, certificates and labels are considered the best indicators that a corporation's behavior is sustainable (Market Analysis-TerraChoice, 2010).⁹ The practical

⁹ The least educated and less affluent the publics are, the most strongly prefer eco-labels as an indication of greener brands (Market Analysis-TerraChoice, 2010). This is critical from a business perspective, as it may discourage companies who expect to charge a premium for their greener products or manufacturing processes—something only the upper classes could afford.

Table 3
Main challenges to using alternative sources of electric power (business sample).

Challenges	Percentage
Financial feasibility	51.3
Supply availability to market players	16.3
Alignment with corporate strategy	15.0
Operational adaptability	11.3
Government regulations	6.3

benefits of eco-labels extend not only to consumers: creating a logo or brand in the form of an eco-label constitutes a means through which corporate patrons can increase the visibility of their decision to purchase AEs and assume the role of vanguards in sustainability, while also improving their odds of attracting talented personnel and increasing customers' loyalty and society's respect (Wüstenhagen et al., 2000).

For all the favorable prospects, eco-labels have many barriers to overcome in Brazil. Despite several active eco-schemes in the country (38 in late 2011, per Ecolabelindex.com), spontaneous awareness of eco-schemes is low and is restricted to a handful of iconic labels (Akatu-Faber Castell-Market Analysis, 2006). This was confirmed by the current research: even though respondents were supposed to be well informed, only half the managers were aware of eco-schemes and certifications (and 25% of these were unable to cite examples). Among consumers, the government-backed, heavily disseminated Procel label, which identifies energy-efficient home electronics, has become synonymous with eco-labeling, and is the example most often cited by consumer participants. Among businessmen, Procel ranks 2nd in recall, yet it achieves the highest rates in credibility and market influence. It is no surprise, then, that a tiny fraction of consumers and about 8% of managers surveyed instinctively referred to a well-recognized label as a good indication that a company makes use of renewables. Thus, as a means of promoting awareness of a business's commitment to sustainable AEs, an SPV eco-label may resonate only for specific product categories, or in specific industry segments.¹⁰

The literature on eco-schemes has long pondered another key factor in a successful eco-labeling project, capable of making intangible features visible and believable to consumers: the presence of an authoritative, recognizable third party to ensure companies' greener performances or processes, and thus grant credibility to the certification (Dendler, 2012; Nimón and Begin, 1998; Teisl and Roe, 2005; Watanatada and Mak, 2011). Regrettably, none of the institutions behind the Megawatt project could fulfill these requirements as they lacked both visibility and market projection; further, they were not formally entitled to serve as trustees or guarantors of the proposal. This seems all the more relevant given the absence of local antecedents for similar eco-labels and cases of corporate malpractice involving the use of false labels, both of which contribute to erode eco-schemes' credibility (Market Analysis-TerraChoice, 2010).

Respondents were shown the concept draft reproduced in Fig. 1 and were probed for their reactions both in terms of comprehension and acceptance. Then, they were shown the preliminary version of the eco-label and asked for their opinions in terms of the design's aesthetic appeal, its ability to express the concept clearly, its ability to influence their purchasing decisions, and its potential to generate ROI. Consumers' reactions to the SPV eco-label concept and draft rapidly raised the issue of credibility. As one participant stated: "What is critical for me is being able to believe in what a company says it is doing. A seal is important, it provides something visual to distinguish and identify, but I also want to understand if that's actually true and how having the seal ensures that." Ultimately, similar comments suggest that consumers expect the seal to serve a broader purpose than simply identifying products and offering a conceptual statement: consumers expect eco-labels to serve as a self-explanatory guide. Among executives, reactions were more related to the long-term prospects of the eco-label. Given the

In spite of being the fastest growing type of energy generation, grid-connected solar photovoltaic projects in Brazil are still scarce, low scale, mostly related to research and irrelevant in terms of power generation. The first, larger scale project will be installed by Eletrosul at its HQ in the city of Florianópolis with expected power generation of 1.2 GWh/year – a quantity large enough to meet energy demands of 680 households. This energy will be sold to firms and given that there is no public policy promoting clean power, those companies that acquire this energy will be pioneers in helping to develop this market in Brazil, in addition to behaving in a more sustainable manner since they will be using clean electricity.

This type of energy is more expensive than conventional power, for this reason the Instituto Ideal, with the support of GIZ, decided to create a seal so the company that acquires this type of energy will have a tool to disseminate this action. The solar seal will enable consumers to identify who is buying the new type of energy. To obtain the seal companies shall acquire a minimum volume of photovoltaic energy for a minimum period of 5 years. The idea behind the seal is not to certify but rather become a sort of "I am in" flagship tool campaign by which companies could also display their will to favor this choice of energy fully available within the Brazilian market.

Fig. 1. The Megawatt Solar eco-label concept proposition.

absence of government backing, they were skeptical about the label's potential to propel major changes in the energy supply. In this sense, managers were uncertain about whether the proposed eco-label would be able to catalyze an engaging platform for SPV adoption.

While consumers welcomed the conceptual proposal of an SPV eco-label, they were critical of the draft design. The concept behind the eco-label also triggered a reflective process, which motivated participants to think of sustainable investments in comparative terms across companies from the same segments. Accordingly, the eco-label seemed instrumental to both a preliminary educational process among consumers and a favorable benchmarking of early corporate adopters likely to benefit from positive word-of-mouth.

Managers sympathized with the scheme concept slightly more than they felt persuaded: 74% reacted favorably, 69% perceived that adoption would generate ROI, and 67% voiced interest in the proposal. As opinions shifted to more material or consequential decisions, the level of endorsement weakened: 62% of executives thought themselves likely to recommend adopting the seal to their boards of directors. Still, the discrepancy between the 74% who agree with the concept and the 62% who are willing to advocate for it before the corporate hierarchy seems, in perspective, rather low.

What elements have the potential to expand or contract this gap? A core factor in reducing the gap relates to the belief that using the eco-label is likely to result in market gains. A large majority of managers (82%) felt that companies using the seal would elicit public prestige. Concurrently, 78% were persuaded that consumers would pay attention to this type of symbol of a company's engagement with sustainability. Reputation is clearly a motivating force. On the other hand, eco-label shortcomings in terms of idea clarity, interpretability, and credibility – boosted the gap, so it did the resistance to paying a premium cost for SPV energy. These are issues more strongly related to the practical, functional aspects of the seal than to its symbolic aspects (like prestige and image gains). For 51% of executives the eco-label, as proposed, was difficult to decode (alarming, 54% of those in the communications and sustainability departments thought this way)—a disadvantage that echoed among consumers (on a scale of 1–5 for interpretability, the eco-label rated only 2.75 points, its lowest score among several other features probed).

Would the SPV eco-label successfully travel from concept to visual representation? The final step of this research involved testing a first draft of the eco-label to ascertain how well it communicated the idea of a pioneering, corporate-sponsored SPV development program (see Fig. 2). Both publics reacted ambiguously to the graphic representation of the eco-label, thus showing a

¹⁰ As of late 2011, according to Ecolabelindex.org, there were only four eco-labels related to solar energy and 74 related to other energy issues around the world (though mostly connected to energy efficiency and not to AE adoption). Thus, it is not surprising to find such a low association among Brazilian stakeholders.

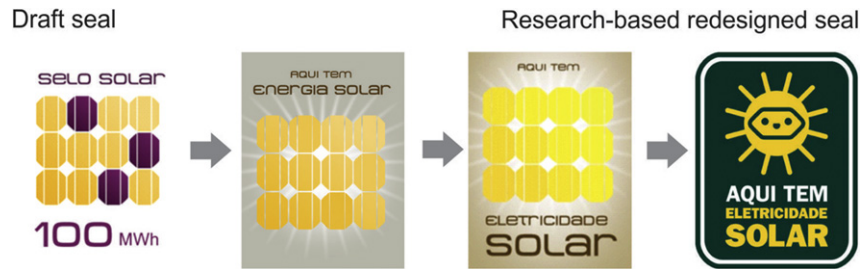


Fig. 2. Solar energy eco-label evolution: adapting to stakeholders' needs and expectations.

far stronger alignment with the conceptual proposition than with the visual logo. It is not news that transitioning from well-defined or positively perceived concepts to effective visual expressions of those ideas is a difficult task; furthermore, and counter-intuitively, there is evidence that text-based information like a conceptual written message might be more effective for eco-labels than pictorial information (Tang et al., 2004).

Consumers were relatively disappointed by the design, as they felt it delivered only partial cues ("Not everyone is aware that solar collectors have that shape," consumer) and lacked eye-catching potential ("Visually, it is far from mind-blowing," consumer). In other words, two "must have" conditions were missing: cogent and easy to assimilate information about the benefits of the concept, and striking graphic attractiveness. Further, while the eco-label's yellow dishes automatically elicited associations with the sun, respondents indicated that, for the seal to be successful as a communication tool, more vivid hues were needed to evoke the substantive emotions behind consumers' approval for clean energy. Lastly, a few consumers complained that the second and third drafts of the eco-label evoked matters of religiosity, conflicting with the notions of science and technology that energy innovations like SPV were supposed to convey.

Managers were also only mildly excited by the image of the eco-label. One in three rated it lower than 7 points on a 1–10 scale. Reasons for the half-hearted response relate to core communication deficits: the draft seal did not deliver an effective sustainability message because the concept was either missing or difficult to infer from the seal. The value of an energy eco-label was thus neutralized, as respondents had difficulty connecting the visual representation to the essence of the proposal: energy supply. Lastly, aesthetic shortfalls constituted another source of criticism.

While this final criticism may appear superficial in nature, it raises a relevant issue that is often overlooked by the eco-label debate: the need to provide a means for a lively engagement by prospective users. Marketing and advertising industries have long found that customer commitments are not exhausted by information supply and, thus, rely upon factors beyond cognitive stimuli. Informational inputs cannot be ignored, but neither can the need for emotionally engaging elements, capable of motivating interest and inspiring content identification and assimilation (Rex and Baumann, 2007). Such considerations were instrumental in promoting a transition from the rational language of the first draft of the SPV eco-label to a new design that integrated informative and affective language styles (see Fig. 2).

Given the reactions elicited, the draft seal was clearly not an effective tool for converting favorable attitudes toward renewables and eco-labeling into corporate sponsorship commitment to the project. Further, the draft seal may have lowered both publics' confidence in eco-labeling, as its deficiencies were perceived to reduce the credibility of the initiative. A key implication was that unless the seal was reworked to clearly express core themes of sustainability and energy in a visually appealing manner, it would

not be possible to bridge the support gap. Confronted with a scenario in which Megawatt's high potential for success could be diminished by the label's underperforming visual proposal, the parties involved in the project reformulated the eco-label design, integrating market research suggestions and lessons. The new seal addressed these concerns and closely reflected stakeholders' expectations about what a sustainable energy eco-label should include (see Fig. 2).

Similarly, research insights inspired a larger review of Megawatt's clients' strategy. After the seal was redesigned, it was agreed that the next critical step would be a public education campaign to introduce the eco-label and also to raise awareness about the singularity of SPV, thus increasing its perceived value among consumers and business customers. This campaign plan has led to a finalized logo usage guidebook, an educational primer and video, and a "best business practices" manual for responsible eco-label marketing use. It was understood that this educational campaign—presented through printed media, specialized magazines, internet, and energy and sustainability events—would be more effective if set in motion before broader disclosure of the seal.

Along with these decisions, research helped the project authors to conclude that the seal will have stronger resonance if used in institutional campaigns by corporate patrons, instead of in product packaging. This approach seems more effective in building trust and mobilizing choice among potential business customers. Finally, the group of twelve corporations sponsoring this pioneering SPV initiative have planned a joint communication campaign, centered on the social value of adopting clean energy, at customers' locations (e.g., employees' offices, retailers' stores and point of sales) or at company-sponsored events (e.g., shows and fairs, industry conferences).

6. Conclusions

Solar photovoltaic energy faces a prosperous destiny in Brazil. Government approval of micro generation of energy at the household level is highly likely to boost the industry of SPV design, equipment manufacturing and installation (ANEEL, 2012), a decision lately followed by announcements on a USD 118 million credit line for solar energy (Nascimento, 2012). At the same time, the largest energy distributor in the northeast region, Chesf, announced investments of over USD 41 million in SPV testing units (Jornal do Brasil, 2012); in the southeast region, one major stadium is promising to satisfy all its energy needs with solar by end of 2012 (Nogueira, 2012).

The pioneering role of the Megawatt project and its subsequent success throughout 2012 suggest a substantial interest in solar energy. Key to the project success was the fact-based understanding of how different suppositions entertained by its authors actually resonated in the public's mind. Thus, market research contributed to building a sharper business proposal in four ways. First, it helped to unveil myths and beliefs that hampered the

conversion of positive attitudes into mobilization in favor of renewables (what we called the support gap). Secondly, research assessment and dimensioning of the perceived benefits of adopting AEs furnished favorable arguments for the selling proposition behind the Megawatt concept and eco-label. Thirdly, the testing of concepts and visual cues related to the eco-label enable an improved alignment of these with stakeholders' expectations and rationales about clean energy. Fourthly, research allowed identifying how to potentiate the impact of powerful heuristics such as eco-labeling.

One major finding of the study points to the favorable endorsement of AEs at the abstract level yet without the proper understanding of the limitations and possibilities of specific sources of energy like SPV. This feeds some ambiguity in terms of the weight of energy choices within a corporate strategy of sustainable policies both for managers and end consumers. We conclude that efforts to educate the attentive public are needed not just to overcome the sustainability penalty suffered by AEs or to seek conversion of broader sympathy into bold support but, particularly, to build up firmer legitimacy grounds for a large-scale transition toward more sustainable power sources.

The importance of financial barriers to motivate a wider adoption of AEs represents another relevant research outcome. It takes two forms, a perception of high entry costs and a concern about the timing until investment is amortized. These preoccupations place decisions on improved financing at the center of the debate in order to scaling up the adoption of AEs.

One last conclusion drawn from analysis cautions against pre-suppositions that eco-labeling automatically implies conveying effective information or eliciting perceptions of transparency and confidence. Favorable opinions toward eco-labels will not overcome expectations for third-party reassurances of the proposed sustainability claims nor would reduce the demand for digestible and saleable information on how the sustainable impact is taking place.

This study served to document the obstacles and opportunities for implementing renewable energy solutions in emerging markets, like Brazil. In doing so, it offered insights and helped to identify specific rationales influencing prospective customers and their ability to channel favorable attitudes into supporting behavior. Special attention was given to recording the conditions under which pioneering eco-labels can become effective tools for creating incentives for business and consumers to change the market in direction toward sustainability.

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