



# Diffusion of distributed solar photovoltaic generation in Brazil: Challenges and Scenarios<sup>1</sup>

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## I- Introduction

The rapid and intense diffusion of photovoltaic solar energy technologies witnessed on a global level, can be interpreted as the consequence of two main driving forces: the transition to a more renewable and less polluting matrix, and from a geopolitical perspective, the desire to secure and guarantee future energy supply. This process mainly takes place in the developed economies and emerging countries with a higher economic density, such as the case of China and India. The advances of this new source of energy generation is contributing to the technological revolution occurring in the electricity sector. Independently of the earlier mentioned driving forces, this transformation holds great benefits for Brazil as a whole, while for electricity sector the main motivation lies in the possibility to obtain tariff reductions.

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Recently a group of researchers from Gesel-UFRJ participated in what was considered the most important events about solar energy, hosted in Rio de Janeiro and organized by Canal Energia: **Brasil Solar Power**. An estimated 1500 people representatives of the most important stakeholders with the distinguished presence of the new Minister of Mines and Energy as well as specialists and international companies.

One of the topics which gained particular attention was that of distributed generation (DG). This was a consequence not only of its technological peculiarities and growth potential but, as some specialists noted, of its potential to herald a paradigm change within the Brazilian Electricity Sector (BES). In this context, and specifically for the mini and micro generation generation, a lively discussion emerged related to issues involving opportunities, challenges, and the main obstacles for the diffusion of this type of generation.

Among the specialists there existed a general consensus about what the main obstacles were for the development of photovoltaic distributed generation:

- (i) the necessity to innovate the regulatory framework in order to allow the commercialization of excess electricity produced by photovoltaic systems, thus enabling the emergence of new business models.
- (ii) new tax incentives
- (iii) the lack of adequate financing instruments for private individuals.

The following article aims to identify the main contributions presented at Brazil Solar Power through the analytical lens of academia.

## **II- Commercialisation**

The possibility to allow for the commercialization of excess production of small size photovoltaic systems, could contribute to incentivize the diffusion of this new generation source . The energy compensation system in which electricity that is injected to the grid is treated as barter was instituted through Resolution 482. This resolution is responsible for regulating the access of micro and mini generation to the grid. In 2015, the regulator advanced in resolving this question through the Resolution 687 which came to the fine and establish the following parameters:

- (i) Changes in the range over capacity for micro and mini generation to 75 kW and 5 MW, respectively.
- (ii) The creation of two new business models, shared generation and the installation of distributed generation in apartments complexes.
- (iii) An extension of the expiration of energy credits from 36 to 60 months.
- (iv) Changes in the basic procedures for connecting to the grid, imposing new conditions for the distributors in order to make the process simpler and faster.

Specialists emphasized that the essence of Resolution 687 lies in **sharing**, but that there is no foreseeable plan to allow for the commercialization of energy. That being said, one can foresee that the regulatory path of DG will have to consider excess generation trading as an important instrument for the development of DG, especially for its characteristic of enabling new business models.

In this context, the important role of the retail supplier, as a contributing actor to the dynamism and diffusion of new businesses, was asserted. None the less it was identified that one of the greatest barriers to the consolidation of this agent lies in the judicial uncertainty. The current context exposes the supplier to financial risks because of this judicial responsibility to continue providing electricity even in the absence of payment. This is of course a financial risk which must be addressed by those agents and the regulator.

The case of adequately valuating these ancillary services, coupled with a scenario of greater possibilities for commercialisation, could facilitate and stimulate new businesses and consequently contribute to making DG more competitive. Thus the challenge lies in creating the appropriate economic signals which permits the “prosumers”<sup>5</sup> to incorporate into their assessment of the investment’s rate of return, the additional income resulting from the new opportunities to monetize their own

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<sup>5</sup> Agents who are at the same time consumers and producers of electricity.

electricity generation. This could be further enabled through the integration of automation devices into photovoltaic systems.

### **III- Taxation**

The issue of taxation was identified as a central obstacle to the development of solar photovoltaic GD . A strong disincentive to the expansion of this new energy source, was the Covenant ICMS n° 6/2013. It determined that the basis for calculating the ICMS would be the total compensated energy, which includes the electricity produced by ones own photovoltaic panels. In this way, the “prosumers” were taxed for their overall consumption including their own energy production. As a logical consequence, the attractiveness of the projects, from the investment point of view, was negatively affected, hampering the diffusion of such projects. In reaction to much criticism emanating from different stakeholders, the covenant was changed in 2015 through the Covenant n° 16/2015. In it, the responsibility to decide on whether to exempt micro and mini generation from paying ICMS was delegated to the individual states. As of today, 16 states have incorporated the new rule into their system, which should be considered an important advance in the process of greater diffusion of this new technology.

Additionally, with the introduction of the Covenant n° 130/2015, the earlier Covenant n° 16/2015 was further changed. According to the new rule , the fiscal exemption for electricity production in micro and mini generation was restricted to systems with installed capacities of up to 100kw and between 100kW to 1MW respectively. This categorization reflected the criteria defined through the Aneel Resolution n.º482/2012, which had been changed through Resolution n.º 687/2015. Thus the new taxation system established through Covenant n° 130/2015 is not in line with the most recent taxation rules for DG.

Another restrictive element is present in article 1 of the covenant ICMS n° 16/2015, which permits the collection of the tax over the use of the distribution system (TUSD) even in the case of consumers within a **monomial** tax system.

In this sense, the stakeholders indicated the necessity to adjust the present ICMS covenants mentioned earlier, in order to align the accepted capacity range with

the Aneel Resolution n.º 687, and also to clarify that the taxation should only take into consideration the net electricity consumption.

#### **IV - Financing**

Another topic that provoked a lot of questioning, was the lack of alternatives for financing investments in DG- SPT. There was an overall consensus over the lack of existing credit instruments which offer attractive conditions for investing in solar photovoltaic generation, especially for private individuals. It also became clear that initiatives to incentivise SPT energy, especially from a taxation and financing point of view, were strongly linked to decision making on a state level. As a consequence, the current situation displays a strong heterogeneity among the policy initiatives of the different states and even municipalities. That being said, the unanimous conclusion was that there is an overall lack of access to financial credit for private individuals.

On that note, it is important to emphasize the important role of the BNDES and its lines of credit. There was little disagreement over the strategic function of the bank as a principal financial actor of the SEB. Still, in the case of DG- SPT the current conditions for financing offered by the bank were criticized by representatives of the private sector.

Given the changes in the BNDES financing pattern that have been discussed, it might be expected that the credit offer to private individuals will also come from private banks, in which financing costs are much higher.

#### **V- Conclusion**

Overall, the Brasil Solar Power congress contributed to organize and consolidate important propositions about the current limits of the expansion of DG. First of all, there is a growing interest in photovoltaic generation in Brazil, in such a way that the general consensus among specialists and stakeholders was that this new source of energy generation has a huge potential in the country. This potential needs to be fostered, not through subsidies, but through the right incentive mechanisms characterised by innovative regulation, appropriate taxation and financing. Second of all, the possibility of commercializing excess production was identified as a decisive

factor in enabling new business models and consequently increasing the attractiveness of investment. Lastly, the issues of financing and taxation are in their current form identified as the major obstacles for the development of DG- SPT. In this regard, there is a demand for more adequate regulatory mechanisms in order to support greater diffusion.