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PHOTOVOLTAIC ENERGY GENERATION AS AN INDUCER AND PROMOTER OF THE 2030 AGENDA

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Abstract
This article seeks to analyze how the generation of photovoltaic energy by the government can serve as an inducing and promoting tool for the Sustainable Development Goals (SDGs) of the 2030 Agenda in the city of Campo Grande - MS. It is justified by the opportunity to maximize

the fulfillment of the goals proposed by the United Nations with a project that in itself already meets one of them. The general objective of the article is to demonstrate how the generation of photovoltaic energy by the public power can contemplate other sustainable development objectives in addition to SDG 7 - Clean and affordable energy; the secondary objectives being the characterization of expenditures in the municipality of Campo Grande – MS with electricity; measuring the estimated impact on public accounts for such a project; and the identification of the new ODS's served with the photovoltaic generation project. The methodology adopted is an exploratory research of a qualitative nature. The results found demonstrate how the preparation of public procurement notices can be used to facilitate the transition to sustainability, maximizing compliance with the Sustainable Development Goals of the 2030 Agenda.
Keywords : 2030 agenda, sustainable development, sustainability, sustainable cities, transition to sustainability.

INTRODUCTION

The transformations that the world has gone through, generate every day an increase in life expectancy in each individual inserted in this environment, as well as an increase in energy consumption (BRITO, 2011).

The increase in energy consumption reflects, mainly, on the public power, which seeks to meet the basic needs of citizens living under its jurisdiction. And this reflex reduces the financial capital available for application in other areas necessary for the development of the city.

With several solar generation projects in public agencies, Brazil reflects a global trend and the economy provided by these systems make them very attractive (SOLAR, 2020).

The Brazilian tropical location and the climate of the cerrado, where the city of Campo Grande - MS is located, with a seasonal tropical climate, with dry winters and rainy periods, creates an enormous potential, currently idle, for the installation of energy generation systems. photovoltaics in public buildings (MIRANDA, 2013).

It is also observed that public purchases can, with legal support, be used to promote sustainable development and local development, generating social, environmental and economic benefits (MMA).

Considering that the Sustainable Development Goals (SDGs), proposed by the United Nations (UN) in the 2030 Agenda, *"are a global call to action to end poverty, protect the environment and climate and ensure that people everywhere can enjoy peace and prosperity"* (UN, 2021).

This article presents a position of the potential that the generation of photovoltaic energy, by the public power, has as a tool inducing and promoting the sustainable development

objectives of the 2030 Agenda in the city of Campo Grande -MS, if public procurement procedures are adopted with a view to the local development and sustainability.

DEVELOPMENT

The world has been going through a scenario of transformation, the control of nature (greater supply of food) and its threats (disease control), allowed a faster population growth, not because there was an increase in birth rates, but an increase in Life expectancy. It is noted, however, that economic development can reduce population growth, but energy consumption grows faster than the population (BRITO, 2011). This situation is extremely worrying, therefore, many actions in different countries of the world are organized to minimize these problems. One such organization is the United Nations (UN).

Brazil, as a member country of the UN, is a participant in the 2030 Agenda published in UN Resolution A/Res 70/1, of 25.09.2015, where the Sustainable Development Goals (SDGs) were established. The 2030 Agenda is an action plan that seeks to strengthen world peace and the eradication of poverty in all its forms, and the SDGs are an extremely ambitious and transformative vision in the search for a world that presents sustainable development to all nations. (UN, 2015)(ODSBRASIL, 2021).

In order to apply resources to Sustainable Development, expenditures are often required, which include purchasing materials and contracting services. The Public Administration is obliged by Art. 37, Section XXI of the Federal Constitution to bid for its purchases of goods and services, which is the act in which it summons, by public notice or invitation, interested companies. The regulation of this obligation was given by the so-called General Bidding Law (Law No. 8.666, of June 21, 1993), which had in Decree 7,746, of June 5, 2012, the regulation of its article 3 to establish criteria and practices for the promotion of sustainable national development. In this way, sustainable public procurement, which is a formal administrative procedure, can contribute to the promotion of sustainable national development, with the incorporation of social, environmental and economic criteria in public notices for the acquisition of goods, services and execution of works. Using the purchasing power of the public sector to generate economic, social and environmental benefits (MMA).

The Brazilian government annually spends more than 600 billion reais on the purchase of goods and services, which is equivalent to approximately 15% of GDP. Therefore, directing this purchasing power to the market for sustainable goods and services “implies the generation

of socio-environmental benefits and the reduction of environmental impacts, while inducing and promoting the market for goods and services" (MMA).

Photovoltaic solar energy has stood out as one of the generation alternatives, easy to execute, in a sustainable and clean way. Making several countries promote its implementation, through incentives, as a way of complementing their energy matrix (TAKENAKA, 2010).

Brazil, due to its tropical location, has high levels of solar irradiation. And public buildings often have their peak load precisely during the daytime, which coincides with the peak of photovoltaic generation. Also having in the constructive characteristics of public buildings excellent continuous flat areas, which for the photovoltaic system, are suitable for its easy implementation (TAKENAKA, 2010).

According to the Minister of Mines and Energy, Bento Albuquerque, in May 2020, "Brazil has more than 900 solar generation projects in public agencies, which will continue to grow, and which reflect global trends for the electricity sector, of greater decentralization and increasingly active participation of consumers, both in demand management and in the production of energy itself" (SOLAR, 2020).

The Superior Electoral Court building in Brasília alone, which opened its distributed generation plant on November 23, 2017, had saved R$ 1.6 million in electricity by May 2020, with an estimate that the implementation costs , of around BRL 5.8 million, to be paid up to 2024, with the average useful life of the equipment being 25 years (SOLAR, 2020).

The location of Campo Grande places its climate, according to the Koppen classification, in the transition range between the humid mesothermal (Cfa) subtype, without drought or small drought, and the humid tropical (Aw) subtype, with a rainy season. in summer and dry in winter, with solar irradiation of 1927.8 kWh/m²/year (INPE/Labsolar), quite significant for photovoltaic generation (PLANURB, 2020) (MIRANDA, 2013).

It should also be noted that the average expenses with electricity of the Municipality of Campo Grande are approximately R$ 18 million per year. In order for the energy to be, in its entirety, generated by a photovoltaic plant, according to a previous feasibility survey, by a specialized company, there would be a need for a plant with an installed capacity of 16 Megawatts, which would occupy an area of approximately 32 hectares (SEGES, 2021).

A project for the implementation of the photovoltaic park for the Municipality of Campo Grande is in the Preliminary Technical Study and subsequent Term of Reference for bidding. With an estimated investment of 60 to 70 million reais, taking into account the amount spent today with this input, a return on investment is expected in a period of approximately 4 to 5

years. Considering the high value of investment to be carried out, a study of a new proposal, minigeneration (SEGES, 2021) was thought.

According to Resolution 482, of April 17, 2012 of the National Electric Energy Agency – ANEEL, the limit for distributed mini-generation is 5 Megawatts, limited to the power available to the consumer unit. This fact led to a change in strategy to a shared generation configuration, where multiple consumer units generate and benefit from the electricity compensation system (SEGES, 2021).

Thus, the pilot project, which will guide future bids, in order to meet all the demands of the Municipality of Campo Grande, will include the Municipal Department of Education - SEMED, which has an average monthly consumption of 956,536.90 kW/h. Being implemented in 254 consumer units out of a total of 613. Studies will be carried out of each unit, with the collection of consumption data based on the year 2019, in view of the interference, with consumption reduction, caused by the closing of many units due to the COVID-19 pandemic (SEGES, 2021).

The implementation of this system will have approximately 17,382 photovoltaic modules, which after implementation in the 254 SEMED units, will have an energy generation of approximately 961,775.02 kWh, as shown in Table 1.

Table 1 - Data from consumer units to be implemented in photovoltaic plants in the municipality of Campo Grande-MS.

modules	17,382
configured area	49,712.52 m²
configured power	7,126.62 kWp
Annual average generation	11,541,300.36 kWh
Average monthly generation	961,775.02 kWh
Average monthly consumption	950,745 kWh
Average cost of kWh	BRL 0.98
kWh / module	54.7
CO_2 emissions avoided	326,196,557 kg CO_2/year

The data were provided by the Municipal Secretary of Management of Campo Grande - SEGES

The estimated cost for implementing the system is approximately 26 million Reais, which, considering the various units where they will be implemented, can be broken down and bid for per consumer unit, encouraging local entrepreneurs in the photovoltaic energy market, so that small regional companies come to answer the call for public notice, providing the installation of the system. In this way, the project will be able to provide local economic and social development, further stimulating the market for micro and mini photovoltaic energy generation.

CONCLUSION

Considering the 2030 Agenda, the pursuit of its goals is of paramount importance to achieve a sustainable future, with the public power being an important actor, a true *stakeholder* , capable of inducing a change of culture in the society in which it is inserted.

The public power, through its constituent bodies, has in its hand the power to mobilize all its purchasing power to transform the current scenario, without violating the imposed regulations, and provide the social and economic development of its region.

Public purchases, more specifically the bidding for goods and services, with the economic power they have, should be used to pursue the goals of the 2030 Agenda. At this point, a photovoltaic generation project, as presented in your bidding , according to the legislation in force, promote local development, by requiring the participation of regional companies or companies that use a percentage of local labor. Thus, in line with Sustainable Development Goal number 12 (SDG 12) – *"Responsible Consumption and Production"* and Goal 12.7 *"Promote sustainable public procurement practices, in accordance with national policies and priorities"* (TCU, 2017)(UN, 2021).

Considering the public call for local companies to meet this demand from the government, which would encourage not only existing micro and small companies, as well as the entire sector in which they are inserted, a photovoltaic generation project would encourage entrepreneurship, innovation and job growth in the area. In this way, also working with Sustainable Development Goal number 8 (SDG 8) – *" Decent work and economic growth"* and Goal 8.3 *"Promote development-oriented policies that support productive activities, generation of decent employment, entrepreneurship, creativity and innovation, and encourage the formalization and growth of micro, small and medium-sized enterprises, including through access to financial services"* (UN, 2021).

Considering only the idea of renewable energy generation, and in view of the impact on

public accounts and the savings provided, highlighting the way in which it will be tendered, a photovoltaic generation project would meet the generation of clean energy and with less impact on the environment. environment. Thus, in line with Sustainable Development Goal number 7 (SDG 7) - " *Clean and affordable energy"* and Target 7.2 *"By 2030, substantially increase the share of renewable energies in the global energy matrix* " (UN, 2021).

In this way, the generation of photovoltaic energy by the public power as a tool to induce and promote sustainable development goals in the city of Campo Grande - MS is a feasible project, which is in line with Sustainable Development Goal number 11 (SDG 11) - *"Sustainable cities and communities"* and the Targets: 11.6 *"By 2030, reduce the per capita negative environmental impact of cities, including by paying special attention to air quality, municipal waste management and other* " and 11.a "Support economic relationships, positive social and environmental impacts between urban, peri-urban and rural areas, reinforcing national and regional development planning" (UN, 2021).

It is urged to point out that indirectly the economy provided may contribute with other SDGs, in view of the availability of revenue for new investments in society, but which would need a legal text of the destination to quote them.

The example explained in this article seeks to demonstrate that the transition to sustainability does not depend on the creation of new laws or regulations, it depends on the commitment and dedication of each one to know how to act in favor of a more sustainable future, in which we can all develop. .

BIBLIOGRAPHIC REFERENCES

BRITO, Miguel Centeno. Consumption – Energy Sustainability. University of Lisbon, 2011. Available at https://fenix.ciencias.ulisboa.pt/downloadFile/281612415664509/consumo.pdf

Ministry of the Environment (MMA). Sustainable public procurement. Available at http://a3p.mma.gov.br/compras-publicas-sustentaveis/

MIRANDA, Raul Figueiredo Carvalho. Analysis of the Insertion of Distributed Generation of Photovoltaic Solar Energy in the Brazilian Residential Sector. Raul Figueiredo Carvalho Miranda – Rio de Janeiro: UFRJ/COPPE, 2013. Available at http://antigo.ppe.ufrj.br/ppe/production/tesis/miranda.pdf

Sustainable Development Goal 11. Available at https://brasil.un.org/index.php/pt-br/sdgs/11

Sustainable Development Goal 12. Available at https://brasil.un.org/index.php/pt-br/sdgs/12

Sustainable Development Goal 7. Available at https://brasil.un.org/index.php/pt-br/sdgs/7

Sustainable Development Goal 8. Available at https://brasil.un.org/pt-br/sdgs/8

ODSBRASIL Brazilian Indicators for the Sustainable Development Goals. Available at https://odsbrasil.gov.br/home/agenda

United Nations (UN). About our work to achieve the Sustainable Development Goals in Brazil. 2021. Available at https://brasil.un.org/pt-br/sdgs

United Nations (UN). Transforming our world: the 2030 Agenda for Sustainable Development. UN – 2015. Available at https://www.un.org/en/development/desa/population/migration/generalassembly/docs/globalcompact/A_RES_70_1_E.pdf

Socioeconomic Profile of Campo Grande – 2020 27th Revised Edition. Available at https://drive.google.com/file/d/18LnMb7uE5S0OZn4Lu7Wzj3RM2U_s_I8_/view

MUNICIPAL MANAGEMENT SECRETARIAT - SEGES -Personal contact

SOLAR, Portal. Brazil already has 900 solar generation projects in public bodies, says Minister of Mines and Energy.Portal Solar - 2020. Available at https://www.portalsolar.com.br/blog-solar/energia-solar/brasil-ja- has-900-solar-generation-projects-in-public-organisations-says-minister-of-mines-and-energy.html

TAKENAKA, Fátima Oliveira. Evaluation of the Potential of Photovoltaic Solar Energy Generation in the Coverage of the Buildings of Campus I - Cefet-Mg, Interconnected to the UFSC Electric Grid - 2010. Available at https://fotovoltaica.ufsc.br/Dissertacoes/Dissertacao_Fatima_Oliveira_Takenaka.pdf

Federal Audit Court (TCU) Sustainable Public Procurement in the context of the 2030 Agenda and the SDGs. 2017 Available at https://portal.tcu.gov.br/data/files/51/17/D3/FD/F34FC5108BCB7CC51A2818A8/Painel%201.%20As%20compras%20p%C3%BAblicas%20no%20contexto%20dos% 20ODS%20-%20UNEP.pdf

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