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法律和可再生能源

DIREITO E ENERGIA RENOVÁVEL

**LAW AND RENEWABLE ENERGY**

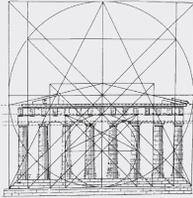




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DIREITO E ENERGIA RENOVÁVEL  
**LAW AND RENEWABLE ENERGY**

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DIREITO E ENERGIA RENOVÁVEL  
**LAW AND RENEWABLE ENERGY**



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Gostaríamos de agradecer ao CNPq e à CAPES pelo apoio.

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## **Dedication**

This book would not have been possible without the support of the International Cooperation Agency of the Federal University of Paraíba through the hands of Professor Ana Berenice Peres Martorelli.

To the Graduate Program in Legal Sciences at the Federal University of Paraíba and the Liaoning University Law School, China.

We would like to thank CNPq and CAPES for their support.



“ No novo tempo  
Apesar dos perigos  
Da força mais bruta  
Da noite que assusta  
Estamos na luta  
Pra sobreviver  
Pra sobreviver  
Pra sobreviver.

(LINS, Ivan. **Novo tempo**. Disponível em:  
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# SUMMARY

序言 / APRESENTAÇÃO / PRESENTATION.....	11
序言 / APRESENTAÇÃO / PRESENTATION.....	15
前言 / PREFÁCIO / PREFACE.....	19
<b>1   以可再生能源发展为核心的中国能源革命法治保障</b> A REVOLUÇÃO ENERGÉTICA DO SISTEMA LEGAL CHINÊS COM ENFOQUE NO DESENVOLVIMENTO DE ENERGIAS RENOVÁVEIS <b>THE LEGAL SYSTEM OF CHINA'S ENERGY REVOLUTION WITH THE DEVELOPMENT OF RENEWABLE ENERGY AS THE CORE</b> .....	25
闫海 (Hai Yan); 王洋 (Yang Wang)	
<b>2   技术科学知识在墨西哥能源转型规划中的社会应用</b> A APROPRIAÇÃO SOCIAL DO CONHECIMENTO TECNOCIENTÍFICO NO PLANEJAMENTO DA TRANSIÇÃO ENERGÉTICA MEXICANA <b>THE SOCIAL APPROPRIATION OF TECHNO-SCIENTIFIC KNOWLEDGE IN THE PLANNING OF THE MEXICAN ENERGY TRANSITION</b> .....	51
Ezequiel Zárate Toledo (以西结·托莱多)	
<b>3   哥伦比亚的可再生能源和能源转型: 进展和挑战</b> ENERGIA RENOVÁVEL E ENERGIA DE TRANSIÇÃO NA COLÔMBIA: APORTES SOBRE AVANÇOS E DESAFIOS <b>RENEWABLE ENERGIES AND ENERGY TRANSITION IN COLOMBIA: POINTS ON ADVANCES AND CHALLENGES</b> .....	67
John Zapata Ochoa (约翰·萨帕塔)	
<b>4   能源政策和可再生能源: 巴西概览</b> POLÍTICA ENERGÉTICA E ENERGIAS RENOVÁVEIS: O PANORAMA BRASILEIRO <b>ENERGY POLICY AND RENEWABLE ENERGY: THE BRAZILIAN OVERVIEW</b> ...	89
Laura Emilia Beatriz Lourenço Damasceno (劳拉·达马斯塞诺)	
<b>5   可再生能源和巴西风力发电合同的法律制度</b> ENERGIAS RENOVÁVEIS E O REGIME JURÍDICO DOS CONTRATOS PARA GERAÇÃO DE ENERGIA EÓLICA NO BRASIL <b>RENEWABLE ENERGIES AND THE LEGAL REGIME OF CONTRACTS FOR WIND POWER GENERATION IN BRAZIL</b> .....	109
Mariana Traldi (玛丽安娜·特拉尔多); Rárisson Jardiel Santos Sampaio (拉里松·桑帕约)	
<b>6   可再生能源市场产权配置方式</b> O CAMINHO DO DIREITO DE PROPRIEDADE DO MERCADO NA ALOCAÇÃO DE ENERGIA RENOVÁVEL <b>THE WAY OF MARKET PROPERTY RIGHT ALLOCATION OF RENEWABLE ENERGY</b> .....	131
韩英夫 (Yingfu Han); 高斯 (Si Gao); 王艺莹 (Yiyi Wang)	
<b>7   巴西乡村可再生能源园区的所有权、产权处置和中国替代方案</b> POSSE, DIREITO DE PROPRIEDADE E DESPOSSESSÃO DO CAMPESINATO BRASILEIRO NOS PARQUES DE ENERGIA RENOVÁVEL E A ALTERNATIVA CHINESA <b>POSSESSION, PROPERTY RIGHTS AND DISPOSITION OF BRAZILIAN PEASANTS IN RENEWABLE ENERGY FARMS AND THE CHINESE ALTERNATIVE</b> .....	151
Fernando Joaquim Ferreira Maia (费尔南多·迈亚)	

## 8 | 财产和可再生能源的法律制度

REGIME JURÍDICO DA PROPRIEDADE E ENERGIA RENOVÁVEL

**LEGAL REGIME OF PROPERTY AND RENEWABLE ENERGY** ..... 177

Karolina Maria Fonsêca de Souza (卡罗琳娜·索扎); Fernando Joaquim Ferreira Maia (费尔南多·迈亚)

## 9 | 中国可再生能源项目用地制度调整与改进方向

AJUSTE INSTITUCIONAL E MELHORIA NA DIREÇÃO DE USO DO SOLO PARA PROJETOS DE ENERGIA RENOVÁVEL NA CHINA

**INSTITUTIONAL ADJUSTMENT AND IMPROVEMENT IN THE DIRECTION OF LAND USE FOR RENEWABLE ENERGY PROJECTS IN CHINA** ..... 199

佟彤 (Tong Tong); 戈杨心怡 (Yangxinyi Ge)

## 10 | 巴西的环境税和可再生能源

TRIBUTAÇÃO AMBIENTAL E ENERGIAS RENOVÁVEIS NO BRASIL

**ENVIRONMENTAL TAXATION AND RENEWABLE ENERGY IN BRAZIL** ..... 219

Ana Paula Basso (安娜·巴索)

## 11 | 绿色税制对中国可再生能源产业发展的影响

O EFEITO DO SISTEMA DE TRIBUTAÇÃO VERDE NO DESENVOLVIMENTO DA INDÚSTRIA DE ENERGIAS RENOVÁVEIS NA CHINA

**THE EFFECT OF GREEN TAX SYSTEM ON THE DEVELOPMENT OF RENEWABLE ENERGY INDUSTRY IN CHINA** ..... 241

李鹤 (He Li); 刘佳奇 (Jiaqi Liu)

## 12 | 流转税对新可再生能源征税的可行性问题:批判性分析、考虑和观点

A QUESTÃO DA VIABILIDADE DE TRIBUTAÇÃO DAS NOVAS FONTES DE ENERGIA RENOVÁVEIS PELO ICMS: ANÁLISE CRÍTICA, PONDERAÇÕES E PERSPECTIVAS

**THE QUESTION OF THE VIABILITY OF TAXING NEW RENEWABLE ENERGY SOURCES BY ICMS: CRITICAL ANALYSIS, CONSIDERATIONS AND PERSPECTIVES** ..... 261

Waldemar de Albuquerque Aranha Neto (瓦尔德马尔·内图)

## 13 | 环境不公与风能生产:巴西案例

INJUSTIÇA AMBIENTAL E A PRODUÇÃO DE ENERGIA: O CASO BRASILEIRO

**ENVIRONMENTAL INJUSTICE AND WIND ENERGY PRODUCTION: THE BRAZILIAN CASE** ..... 283

Tarcisio Augusto Alves da Silva (塔尔西奥·席尔瓦)

## 14 | 中国可再生能源的许可与社会环境补偿制度与政策研究

INTRODUÇÃO AO LICENCIAMENTO DE ENERGIA RENOVÁVEL DA CHINA, BEM COMO A POLÍTICAS E SISTEMAS DE COMPENSAÇÃO SOCIAL E AMBIENTAL

**INTRODUCTION TO CHINA'S RENEWABLE ENERGY LICENSING AS WELL AS SOCIAL AND ENVIRONMENTAL COMPENSATION POLICIES AND SYSTEMS**... 299

崔晓瑜 (Xiaoyu Cui)

**作者簡介 / BIOGRAFIA DOS AUTORES / AUTHORS' BIOGRAPHY** ..... 319

序言  
**APRESENTAÇÃO**  
**PRESENTATION**

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**T**he International Seminar on Renewable Energy Law, organized in partnership between the Faculty of Law of the Liaoning University of China and the Graduate Program of the Center for Legal Sciences of the Federal University of Paraíba, portrays an important occasion for Academic and Institutional Cooperation between China and Brazil as countries with enormous potential for innovation and the production of scientific and cultural knowledge for the benefit of humanity. On behalf of the Brazilians, I thank you University of Liaoning – China, for the possibility of establishing a fruitful dialogue with the academy of one of the oldest and most important Civilizations in the World. There are 4000 years of history, culture and philosophy accumulated as scientific and human experience on the part of the Chinese people, which certainly strengthens concepts and opens space for methodologies and perspectives for analyzing phenomena that are sometimes unnoticed by the West. We have a lot to learn from these people who have left us a legacy of knowledge over the centuries.

In Brazil, we have a dynamic, enterprising people with great hope for a better and prosperous future, with decent income and happiness for all. There is, hence, an expectation that economic development will bring us many opportunities and allow us to improve the economic and social conditions of our people. A territory rich in biodiversity and with ample energy potential, able to be explored in a sustainable and environmentally balanced way, guaranteeing for future generations the preservation of the economic achievements that we already have in the present through correct political choices and adequate regulation.

The right to development is an indispensable topic of discussion on the international political agenda. Poverty, hunger and exclusion do not help to preserve the environment and rather contribute to the increase of environmental degradation and social ills that make any indicators of economic growth disappear. Sustainable development is not a concept devoid of disagreements or that does not present itself in a multifaceted way. However, it is not possible for central nations to try to impose a policy of perpetuating underdevelopment on the peripheral countries, when they have accumulated wealth from overexploitation and, sometimes, depletion of their own natural resources or the natural resources of their Colonies. It is necessary, for example, to discuss international regulations regarding the immediate transfer of green technologies, stimulating cooperative games, where everyone wins and feeding associated networks of economic production. Our common future depends on the success of these global production networks being able to generate wealth that must be shared in order to establish minimum income standards and social rights accessed by all.

Discussing the right of Renewable Energies is to ensure the possibility of sustainable development, by a path different from that taken by the great central nations. The challenge for Brazil is huge in this sense, because we are going through many difficulties that demand the resumption of investments in the country's infrastructure and a fast

and efficient reindustrialization movement. Opening a parenthesis, in the latter case, we observe that the de-industrialization observed in the last 25 years made jobs disappear that were not absorbed by other sectors of the economy and aggravated economic instability, making us increasingly dependent on the international scenario. Recovering our lost infrastructure and part of the Industrial Park is essential for our development. To achieve these goals, we need energy and planning and investing in renewable energy is the best answer to this challenge. Brazil and the world win if we establish this clean energy matrix as the driver of our development opportunities. For that, we have to discuss internationally the transfer of technologies that assure us the domain of the several forms of ecologically balanced production. There is no point in demanding zero deforestation or reduction of gases in industrial production, without authentic cooperation in the dissemination of low-impact polluting energy.

The texts presented here resulting from the International Seminar on the Law of Renewable Energy open the doors to an unavoidable debate about the driving sources of sustainable and permanent economic and human development, ensuring that central objectives regarding the fight against poverty and moral exclusion and rights are achieved. There is a lot of human suffering that can be avoided or reduced based on formulas for the production of wealth effectively subject to sharing and solidarity gain.

Academics from China and Brazil lend themselves, through this cooperation, to the production of knowledge that serves as a basis for an adequate regulation of the matter, taking into account the international law for people's development and the common principles of environmental protection added to the social protection and improvement of institutions plus the control of planned actions regarding the execution and implementation of this new energy matrix. Law is a language that makes it possible, in addition to resolving

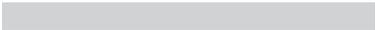
possible conflicts, to guide and put into practice concrete actions in the sense of expanding possibilities for the good use of renewable energies. I believe that the good results of this cooperation can serve as a foundation for ensuring the development and redistribution of wealth to our populations and serve as an example for others to establish with us a cooperative game of solidary and permanent gains.

João Pessoa, August 27, 2022.

**Gustavo Batista** (古斯塔沃·巴蒂斯塔)

Professor and Coordinator of the Postgraduate  
Program in Legal Sciences of UFPB

序言  
**APRESENTAÇÃO**  
**PRESENTATION**



**T**he “International Seminar on Renewable Energy Law”, jointly promoted by the Liaoning University of China and the Federal University of Paraíba in Brazil, is the first step taken after the signing of the cooperation agreement between the two universities in April 2022.

China and Brazil are two of the world’s leading developing countries. China will relentlessly implement the dual carbon targets of peak carbon by 2035 and carbon neutrality by 2060, and will vigorously promote the rapid development of renewable energy. Currently, China’s installed capacity of renewable energy has exceeded 1.1 billion kilowatts, accounting for 44.8% of the country’s installed electricity capacity. Among them, the installed capacity of wind power generation, photovoltaic power generation and biomass power generation ranks first in the world. Renewable energy generation capacity accounted for nearly 30% of total electricity consumption across Chinese society. China has become a big country in the development of renewable energy. With the improvement of energy technology independent

innovation capacity, China is becoming a strong country in renewable energy. Brazil is a world-famous hydropower country and is also accelerating the development of renewable energy, among which biomass energy is unique.

Currently, due to the COVID-19 epidemic and the war between Russia and Ukraine, coal-fired power plants in some countries have been restarted and carbon reduction targets have been adjusted, and the development of renewable energy has suffered setbacks. However, I believe this is just a temporary countercurrent and a temporary measure taken by several countries to face the energy crisis in the short term. The development of renewable energies is one of the important topics for humanity in face of climate change and for countries to strengthen their own energy security. With a bright future, China and Brazil have great potential in the development of renewable energies.

Renewable energy is also a new energy and, as such, it needs the protection of the law and also needs to solve the legal problems in its development. The themes of this seminar come mainly from the project proposal suggested by the Brazilian sponsor, involving many legal issues such as land, contract, environment and compensation for the development and use of renewable energies. Our team and I have found through research that there are common problems as well as individual ones from various countries, many of them are enlightening for the legal development of renewable energy in China.

Liaoning University is a world-class university as determined by the Ministry of Education of China. The Federal University of Paraíba is also a famous higher education institution in Brazil, and law is also a prestigious discipline of its university. A few days ago, China and Brazil signed the China Brazil strategic plan for 2022-2031 and the China Brazil implementation plan for 2022-2026.

The present book, resulting from the international seminar on renewable energy law, jointly organized by the two universities, is a new starting point. We hope to start a long-term strategic cooperation like the two agréments mentioned.

Liaoning, China, August 27, 2022.

**肖海** (Hai Yan)

Dean of Liaoning University Law School,  
Professor and Doctoral Supervisor



前言  
**PREFÁCIO**  
**PREFACE**

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**T**his book is one of the first fruits of the cooperation agreement signed on April 7, 2022 between the Federal University of Paraíba (UFPB) and the University of Liaoning (LNU), in China.

The agreement established the general bases for cooperation in areas considered of mutual interest between the Universities, with emphasis on the research carried out by the Center for Legal Sciences (CCJ) of the UFPB, in particular, in the research groups led by Professor Fernando Joaquim Ferreira Maia (Teaching, research and extension project Dom Quixote/CNPq, which analyzes the implementation of renewable energies in Brazil, particularly in the Northeast Region) and by Professor Ana Paula Basso (GPEDTRS/CNPq, who deals with taxation and development issues), and from the LNU Law School.

The international academic cooperation agreement established a partnership between the two institutions on different areas and actions, as well as the joint development of teaching, research, plus extension activities and an exchange program between China and Brazil, which will be beneficial for new academic possibilities. among Chinese

and Brazilian professors, researchers, administrative staff and students, according to the Dean of Liaoning University, Professor Yishan Pan.

The agreement, as pointed out by Professor Valdiney Gouveia, Dean of UFPB, on the event of the document's signing ceremony, expanded opportunities for collaboration within a partnership that is consolidated between the UFPB and LNU law courses, particularly in relation to the transfer of knowledge, technology and innovation. It is one of the springs that will boost cooperation between the Federal University of Paraíba and Brazil with the prestigious University of Liaoning and China, above all, due to the importance and influence of Sino-Brazilian relations in the international panorama.

Especially, the partnership with the University of Liaoning represents a qualitative leap in the Graduate Program in Legal Sciences (PPGCJ) in the Institutional Plan for Internationalization of the UFPB, in order to achieve the objectives of greater international insertion of the Program, which has already resulted in the holding, on August 27, 2022, of the "International Seminar on Law and Renewable Energy", where professors and students from both institutions participated together, in addition to researchers from other universities and research and teaching institutes. The papers presented at that event, published in this book, deal with legal problems concerning renewable energy in Brazil and China. In this sense, it is worth mentioning that in addition to the Seminar on Renewable Energy Law, and the present book, the result of this seminar, the cooperation between the two universities also resulted in the admission to the Graduate Program in Legal Sciences, as visiting professors, of professors Liu Jiaq and Hai Yan both from Liaoning Law School (Law School of Liaoning University), to voluntarily deliver lectures and seminars and carry out teaching, research and extension activities and publication of scientific papers with our Program in various areas of law. Likewise, Professor Fernando Joaquim Ferreira Maia and Professor Ana Paula Basso, professors of the

Program, were admitted as volunteer visiting professors to carry out the same tasks at the Liaoning Law School (Law School of Liaoning University). It even generated a scientific initiation project, coordinated by professor Ana Paula Basso, and with the participation of professor Fernando Joaquim Ferreira Maia, entitled “Renewable energies and possibilities in Sino-Brazilian relations in facing problems related to land regularization, contracts, taxation, land rent and socio-environmental compensation in the Brazilian Northeast”.

This book is also a product of the initiatives above and opens up several research possibilities in all areas of law, it also creates a link with another culture and civilization. China is one of the main members of the BRICS, a leader in disruptive technologies, in addition to being one of Brazil’s main trading partners.

The theme of renewable energy is current, it touches on topics of sustainability, the environment, tenure and ownership of land, tax and administrative issues. There is a clear repercussion in the development of Paraíba, which is one of the main axes on the expansion of wind and solar energy in Brazil and faces legal problems in all fields.

It is no coincidence that the book is made up of papers presented and discussed at the International Seminar on “Law and Renewable Energy”, jointly organized by the Graduate Program in Legal Sciences at UFPB and the Liaoning University Law School on the 27th. August 2022, counting on its opening with Prof. Gustavo Batista, Coordinator of the Graduate Program in Legal Sciences at UFPB, and with prof. Hai Yan, Director of Liaoning University Law School. The seminar brought together researchers and students from the Graduate Program in Legal Sciences at UFPB and the Law School of Liaoning University, in addition to representatives from the Universidad de San Buenaventura, from Colombia; El Colegio de Mexico; the Federal Rural University of Pernambuco (UFRPE); and the Federal Institute of São Paulo (IFSP). And it was

part of the research activities carried out within the International Cooperation Agreement signed between the law courses of the two universities. At the event, topics of common interest between Brazil and China were discussed, such as energy policy and renewable energy, legal regime of property and contracts related to renewable energy, environmental taxation, environmental licensing and socio-environmental compensation.

The book is the result of an enormous strategic effort by researchers from associated institutions in understanding, sharing experiences, perceptions and research on the problems arising from the economic, political, social and environmental impact of the expansion of renewable energy projects in regards to legal issues, particularly in what may be useful for Sino-Brazilian relations and with other Latin American countries. Among the discussions that will be found are: the importance of renewable energy for China's legal system; the technological revolution in energy transition planning in Mexico; renewable energy and transition energy in Colombia; Brazilian energy policy and renewable energies; the legal framework for wind energy generation contracts in Brazil; the problem of allocation of market property rights in renewable energy; the problem of dispossession of the Brazilian peasantry in renewable energy parks and the Chinese alternative; the legal regime of property and renewable energy; institutional adjustments in improving land use for renewable energy projects in China; problems related to environmental taxation and renewable energy in Brazil; the effect of the green tax system on the development of renewable energy industry in China; criticism of the taxation of new sources of renewable energy by ICMS; the environmental injustice in the production of wind energy in Brazil; environmental licensing of renewable energy parks and social and environmental compensation in China.

Without intending to offer definitive conclusions and/or explanations, it is expected that the reader, in this work, will understand the more general legal problems of the issues created on the expansion of the renewable energy industry in Brazil and China.

João Pessoa, Liaoning, April 25, 2023..

**Fernando Joaquim Ferreira Maia** (费尔南多·迈亚)

**马海天** (Haitian Ma)

**Ana Paula Basso** (安娜·巴索)



以可再生能源发展为核心的中国能源革命法治保障

**A REVOLUÇÃO ENERGÉTICA DO SISTEMA LEGAL CHINÊS COM  
ENFOQUE NO DESENVOLVIMENTO DE ENERGIAS RENOVÁVEIS**

**THE LEGAL SYSTEM OF CHINA'S ENERGY REVOLUTION WITH  
THE DEVELOPMENT OF RENEWABLE ENERGY AS THE CORE**

闫海 (Hai Yan)

王洋 (Yang Wang)



## 摘要

2014年中国提出“四个能源革命+加强国际合作”的新时代能源战略，能源消费清洁低碳转型加快，能源供给能力和质量显著提升，能源技术创新能力不断增强，能源体制机制改革稳步推进，能源国际合作布局更加优化。中国能源法治为中国能源革命奠定坚实基础，形成庞大的能源法律体系，也存在结构性缺陷、内容性缺陷、配套性缺陷和协调性缺陷。中国能源法治的发展重点是制定能源基本法，完善能源法治顶层设计，破除体制机制障碍，推进能源市场化改革，推进绿色低碳发展，优化能源结构与效率。可再生能源发展是中国能源革命的核心，绿色低碳的能源法治也要求推进中国可再生能源法治发展。《可再生能源法》确立总量目标制度、可再生能源规划制度、全额保障性收购制度、分类电价制度、费用分摊制度、可再生能源发展基金制度等，可再生能源法治应当以市场为基础推进可再生能源发展、大力发展分布式能源系统、着力提升可再生能源存储能力。

**关键词：**能源革命；能源法；可再生能源法；光伏扶贫；分布式能源系统。

## RESUMO

Em 2014, a China apresentou a estratégia energética da nova era “quatro revoluções energéticas e fortalecimento da cooperação internacional”. A transição de consumo de energia limpa e de baixo carbono foi acelerada, a capacidade de fornecimento de energia e a qualidade melhoraram significativamente, a capacidade de inovação tecnológica de energia aumentou continuamente, a reforma do regime de energia avançou firmemente e o layout da cooperação internacional de energia

foi otimizado. As disposições no sistema jurídico chinês sobre energia estabelecem uma base sólida para a revolução energética da chinesa, formando um vasto sistema de leis de energia, apesar das deficiências estruturais, deficiências de encaixe e deficiências de coordenação. O foco do desenvolvimento legal sobre energia na China é formular a lei geral de energia, melhorar o design de topo da legislação energética, quebrar os obstáculos do mecanismo institucional, promover a reforma orientada para o mercado de energia, promover o desenvolvimento verde e de baixo carbono e otimizar a estrutura e eficiência energética. O desenvolvimento de energia renovável é o núcleo da revolução energética da China. As disposições legais sobre energia verde e de baixo carbono também requer o avanço daquelas afeitas à energia renovável na china. A lei de energias renováveis deve ser regida por leis baseadas no mercado para definir o montante objetivo integral programas de energias renováveis, sistema de aquisição a preços acessíveis, classificados por esse sistema, sistema de partilha de custos, sistema de fundos de desenvolvimento das energias renováveis, etc., fontes de energia renováveis com o fim de promover o desenvolvimento das energias renováveis, desenvolver sistemas de energia distribuída e melhorar a sua capacidade de armazenamento de energias renováveis.

**Palavras-chave:** Revolução energética; Direito da energia; Direito das energias renováveis; energia fotovoltaica para redução da pobreza; Sistemas de energia distribuída.

## ABSTRACT

In 2014, China proposed a new era energy strategy of “Four Energy Revolutions and Strengthening International Cooperation”. The clean and low-carbon transformation of energy consumption has

been accelerated, energy supply capacity and quality have been significantly improved, energy technology innovation capacity has been continuously enhanced, the reform of the energy system and mechanism has been steadily advanced, and the layout of international energy cooperation has been more optimized. China's energy legal system has laid a solid foundation for China's energy revolution and formed an enormous energy legal system, but there are also defects in structures, contents, supporting rules and coordination among the rules. The development focus of China's energy legal system is to formulate the basic energy law, improve the top-level design of the energy legal system, remove institutional obstacles, promote energy market-oriented reform, promote green and low-carbon development, and optimize energy structure and efficiency. Meanwhile, the development of renewable energy is the core of China's energy revolution, and the green and low-carbon energy legal system also requires promoting the development of China's renewable energy legal system. In future, The Renewable Energy Law should establish the total target system, the renewable energy planning system, the full guaranteed purchase system, the classified electricity price system, the cost sharing system, the renewable energy development fund system, etc. The renewable energy legal system should be based on the market, promote the development of renewable energy, vigorously develop distributed energy systems, and focus on improving the storage capacity of renewable energy.

**Keywords:** Energy Revolution; Energy Law; Renewable Energy Law; Photovoltaic Poverty Alleviation; Distributed Energy System.

## 1 INTRODUCTION

Energy is an important material basis for the survival and development of human society, and an indispensable basic condition for modern social and economic development. In a narrow sense, the energy revolution only refers to a significant breakthrough in energy technology, a major change in energy development and utilization technology that has a profound impact on human production, human life and social development. In a broad sense, the energy revolution refers to the transformation of the social mainstream energy development and utilization system based on major innovations in energy transition<sup>[1]</sup>. The fundamental difference between the energy revolution in the sense of technological innovation and the energy transition is that it takes a long time for major technological innovations in energy development and utilization to occur and promote the transformation of the energy system. It can even be said that an energy transition could only be achieved under the joint promotion of numerous energy technology innovations in the sense of revolution and the matching innovations in energy systems. Throughout the history of human energy, we have gone through the era of firewood energy, coal energy, and petroleum energy. Each energy revolution has fundamentally changed human production methods and lifestyles, triggered a revolution in productivity and production relations, and promoted human beings. The society has moved from primitive civilization, agricultural civilization to industrial civilization. Currently, in the world, the fourth energy revolution is in progress, and it presents the characteristics of global

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<sup>1</sup> 朱彤：《能源革命的概念内涵、国际经济及应注意的问题》，载《煤炭经济研究》2014年第11期。

scope<sup>[2]</sup>, diversification of goals<sup>[3]</sup>, consciousness of development<sup>[4]</sup>, and compatibility with the new industrial revolution<sup>[5]</sup>.

With China's new era energy strategy Four Revolutions, One Cooperation proposed in 2014, the construction of energy legal system is more urgent, and according to the requirements of carbon peaking, carbon neutrality and other major strategic decisions, renewable energy has developed into China's energy revolution and its core content of legal system. This paper sorts out China's energy revolution since 2014, analyzes the construction of China's energy legal system, and focuses on explaining the institutional connotation and direction of China's renewable energy development.

## **2 CHINA'S ENERGY STRATEGY OF FOUR REVOLUTIONS AND ONE COOPERATION**

In 2011, the Outline of the Twelfth Five-Year (2011-2015) Plan for National Economic and Social Development of the People's Republic of China proposed to promote the transformation of energy production and utilization, and reasonably control the total energy consumption. In the 18th National Congress of the CCP 2012, President Hu Jintao made thematic and proposed plans about the energy revolution in China: on one aspect, to promote the revolution in energy production and consumption (so called Double Energy

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<sup>2</sup> 史丹：《论三次能源革命的共性与特性》，载《价格理论与实践》2016年第1期。

<sup>3</sup> 高世宪、任东明等：《推动能源生产与消费革命研究》，中国经济出版社2014年版，第16页。

<sup>4</sup> 朱彤：《能源革命的概念内涵、国际经济及应注意的问题》，载《煤炭经济研究》2014年第11期。

<sup>5</sup> 高世宪、任东明等：《推动能源生产与消费革命研究》，中国经济出版社2014年版，第16页。

Revolutions), control the total energy consumption, strengthen energy conservation and consumption reduction, support the development of energy-saving low-carbon industries and new and renewable energy, and ensure national energy security. On the other aspect, revolution in energy production and consumption replaces revolution in the way of energy production and utilization. In 2014, based on Double Energy Revolutions, a new era energy strategy of Triple Energy Revolutions + Strengthening International Cooperation was formed<sup>6</sup>.

## 2.1 ENERGY CONSUMPTION REVOLUTION

The focus of the energy consumption revolution is to improve energy efficiency, energy conservation and emission reduction. It is necessary to do well in controlling the total amount of coal consumption, implement coal consumption reduction and substitution, and reduce the proportion of coal consumption. From an economic perspective, energy consumption revolution means linking energy consumption with economic growth, imposing strong constraints on total energy consumption control on industries with high energy consumption and industries with excess capacity, and effectively reversing the way of extensive energy use. From a social perspective, energy consumption revolution means firmly establishing the concept of giving priority to energy conservation, actively carrying out national energy conservation actions, promoting green lifestyles by strengthening public opinion guidance, strengthening public awareness of energy conservation, and accelerating the formation of an energy-saving society.

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<sup>6</sup> 赵翔、胡光宇：《国家能源治理——从能源革命到能源治理能力现代化》，清华大学出版社2015年版，第3-4页。

Since 2014, China's energy consumption per unit of GDP has been reduced by 20%, and the average annual energy consumption growth of about 2.9% has supported 6.2% of the national economic growth. The energy consumption structure has been significantly optimized. The proportion of coal consumption has dropped from 65.8% in 2014 to 56% in 2021, with an average annual decrease of 1.4 percentage points, which is the fastest decline in history. The proportion of clean energy consumption has increased from 16.9% to 25.5% in the same period, accounting for more than 60% of the increase in energy consumption. The national ultra-low emission coal-fired power generation unit exceeds 1 billion kilowatts. The clean heating rate in the northern region reached 73.6%, replacing more than 150 million tons of scattered coal<sup>7</sup>. China has fully supplied gasoline and diesel for China VI standard vehicles, built the world's largest charging and swapping network, and a total of 3.918 million charging facilities. The implementation of power construction projects in areas without electricity has made China the first country that everyone has access to electricity among developing countries. China has built 26.36 million kilowatts of photovoltaic poverty alleviation projects, benefiting 60,000 impoverished villages and 4.15 million impoverished households. In the business environment evaluation indicators for continuous optimization of electricity consumption, in the World Bank's global business environment evaluation, China's ranking in the Access to Electricity indicator has risen sharply to 12th, ranking among the Global Best Practices.

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<sup>7</sup> Northern China accounts for 52% of the country's area and 51% of the population. Winter temperatures in northern China are below 0°C, and central heating is provided by public utilities.

## 2.2 ENERGY SUPPLY REVOLUTION

The energy supply revolution focuses on optimizing the energy structure. To this end, China is establishing a diversified supply system, based on the domestic diversified supply to ensure safety, vigorously promote the clean and efficient utilization of coal, as well as develop non-coal energy, actively develop hydropower, safely develop nuclear power, vigorously develop wind power, solar power, solidly promote the development of geothermal energy and biomass energy. Meanwhile, China is simultaneously strengthening the construction of energy transmission and distribution networks and storage facilities.

China's installed power generation capacity exceeds 2.4 billion kilowatts. The per capita installed power capacity has increased from 1 kW in 2014 to 1.7 kW. The per capita electricity consumption has increased from 4,000 kWh to nearly 6,000 kWh, surpassing the United Kingdom and Italy and approaching Germany, France, and other countries. China's power safety operation level is at the world's leading level, and there has been no large-scale power outages. In 2021, China's national coal output has reached 4.13 billion tons, an increase of 260 million tons over 2014, of which large coal mines account for more than 70% of the country's total production capacity. The installed capacity of renewable energy power generation has historically exceeded 1.1 billion kilowatts, accounting for 45.8% of the total installed capacity. In 2021, China's renewable energy power generation will reach 2.49 trillion kWh, accounting for 29.9% of the electricity consumption of the whole society. 33 AC and DC UHV lines were built, and the scale of West-East Power Transmission exceeded 290 million kilowatts. The installed capacity of the pumped storage power station has reached 40 million kilowatts. The cumulative installed capacity of new energy storage exceeds 4 million kilowatts. Total oil and gas production increased from 315 million tons of oil

equivalent in 2014 to 365 million tons of oil equivalent in 2021. Crude oil production has rebounded for three consecutive years, and natural gas production has increased by more than 10 billion cubic meters for five consecutive years.

### **2.3 ENERGY TECHNOLOGY REVOLUTION**

The energy technology revolution requires vigorous development of renewable energy sources such as hydropower, wind energy, and solar energy, and innovative research and development for better use of nuclear energy and biomass energy. China is promoting the progress and development of energetic science and technology with clean coal, smart grid, and new energy vehicles as specific focus points. Thus, promoting the development of low-carbon energy industry with the strategy of Innovative Country, cultivating energy technology and its related industries into new growth points that drive China's industrial upgrading, and gradually turning China into an energy capable country that exports advanced energy technologies, equipment and products to overseas.

China has established a complete clean energy equipment manufacturing industry chain, successfully developed and manufactured the world's largest hydropower unit with a single unit capacity of 1 million kilowatts, and has the manufacturing capacity of a full range of wind turbines with a maximum single unit capacity of 10 MW. The conversion efficiency of photovoltaic cells has repeatedly refreshed the world record. Similarly, conventional oil and gas exploration and production technology has reached the international advanced level, and the shale oil and gas exploration and development technology and equipment have been greatly improved. Furthermore, large-scale third-generation pressurized water reactor nuclear power technologies such as Hualong No.1 and Guohe No.1 have been

formed with independent intellectual property rights. The high temperature gas-cooled reactor technology with the characteristics of four generations is systematically mastered, and various small reactor technologies with different characteristics are being prepared for engineering demonstration. The world's first 1.35 million-kilowatt coal-fired power unit was put into operation, and the 50,000-kilowatt gas turbine with completely independent intellectual property rights achieved full-load and stable operation.

## **2.4 ENERGY SYSTEM REVOLUTION**

The energy system revolution requires the transformation of the government's energy regulation methods, efforts to promote reforms in key areas such as electricity, oil and gas, and energy prices, adhere to the synchronization of streamlining administration and delegating powers and strengthening regulation, and innovating energy administration mechanisms. China is carrying out reforms in energy prices, fiscal, taxation, resources, and circulation systems in a planned and step-by-step manner, restoring the attributes of energy commodities, actively cultivating diversified market players, and forming a unified, open, competitive and orderly modern energy market system. At present, major breakthroughs have been made in the reform of China's electric power system, including the orderly liberalization of electric power generation and consumption plans, the independent and standardized operation of trading institutions and the deepening of the construction of the electric power market. In 2021, the national market-oriented traded electricity will be 3.8 trillion kilowatt-hours, accounting for 45.5% of the total electricity consumption in the society. The incremental electric power distribution business was opened to social capital, and 5 batches of 459 pilot projects for incremental power distribution reform were implemented. There

are about 5,000 electricity sales enterprises registered in electricity trading institutions, forming a market competition pattern of buying and selling more.

## **2.5 ENERGY INTERNATIONAL COOPERATION**

China is promoting high-quality One Belt and One Road energy cooperation. It has successfully held two relative energy ministerial meetings, and the number of member countries that have initiated the establishment of One Belt and One Road energy partnerships has reached 33. It has established intergovernmental energy cooperation mechanisms with more than 50 countries and regions, and established cooperative relations with more than 30 international energy organizations and multilateral mechanisms, as well as cooperate with more than 100 countries and regions on green energy projects. It is interconnected with the oil and gas, electricity and other infrastructures of neighboring countries, striving to achieve energy security under open conditions, and has contributed an important force to promoting the sustainable development of global energy and building a cleaner and more beautiful world.

## **3 LEGAL SYSTEM OF CHINA'S ENERGY REVOLUTION**

The energy revolution is conceived all over the world, but it is always influenced by the situation. An important reason is that people pay more attention to its technological innovation process, but ignore the political, economic, and cultural transformation process it requires and even ignore the legal system revolution. In fact, what really contributed to the revolution was not technological innovation,

but institutional innovation<sup>[8]</sup>. The path for the energy revolution to go from theory to reality is to make rules, especially rules that work. Judging from the nature of the rules, the law may be the most effective rule among the existing institutional rules of humankind. The interdependence among the technological, economic, political, and cultural changes that restrict the energy revolution can be gathered and reflected in the law. However, the laws based on the current system must also undergo institutional innovation, or even revolution, to achieve the perfection in line with the energy revolution<sup>[9]</sup>. Promoting the energy strategy of Four Revolutions and One Cooperation in the new era requires establishing and improving the energy legal system and starting the work of reforming and abolishing laws and regulations in the energy field.

### 3.1 CHINA'S ENERGY LEGAL SYSTEM

The energy legal system is the skeleton of a country's energy rule of law. China's energy legal system is complex: (1) 4 separate energy laws of the Electricity Law, the Coal Law, the Renewable Energy Law, and the Energy Conservation Law (Table 1); (2) More than 30 related laws such as Mineral Resources Law, Nuclear Safety Law, Oil and Gas Pipeline Protection Law, Circular Economy Promotion Law, Cleaner Production Promotion Law, Environmental Protection Law, Resource Tax Law, Resources in The Deep Seabed Area the Exploration and Development Law and the Marine Environmental Protection Law; (3) About 30 energy administrative regulations, 9 energy-related international treaties, more than 200 departmental regulations and

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<sup>8</sup> 肖兴国：《论能源革命与法律革命的维度》，载《中州学刊》2011年第4期。

<sup>9</sup> 肖兴国：《论能源革命与法律革命的维度》，载《中州学刊》2011年第4期。

normative documents, and nearly 1000 local regulations, etc<sup>[10]</sup>. If it includes energy strategy and planning, energy technology standards, etc. with a soft law nature, China's energy laws and regulations are extremely large.

**Table 1.** Formulation and Amendment of China's Separated Energy Law

Separated Energy Law	Legislation Year	AMENDMENT YEAR
Electricity Law	1995	2009、2015、2018
Coal Law	1996	2009、2011、2013、2016
Energy Conservation Law	1997	2016、2018
Renewable Energy Law	2005	2009

At present, China's energy legal system has four defects<sup>[11]</sup>: (1) Structural defects, mainly reflected in the lack of comprehensive and basic laws in the energy field. The subsystems of the energy law are incomplete, and there are no separated energy laws in the fields of oil, natural gas, and atomic energy, and there is also a lack of energy public utility law. (2) Content defects, mainly reflected in the incompatibility of some energy laws and regulations with the direction of energy reform. In addition, there are many legislative blanks in the current laws and regulations, which do not meet the objective needs of the socialist market economic system and need to be revised urgently. (3) Supporting regulations defects, mainly manifested the current separated energy laws generally have the problem of relatively principled regulations

<sup>10</sup> 叶荣泗、吴钟瑚主编：《中国能源法律体系研究——能源立法：战略、安全、可持续发展》，中国电力出版社2006年版，第3页。

<sup>11</sup> 叶荣泗：《我国能源安全的法律保障》，载《中国发展观察》2008年第1期。

and poor operability. They require more supporting regulations to be implemented. Some laws clearly stipulate that the administrative regulations should be formulated, but in fact, such regulations could not be formulated for a long time, either because no organization drafted it, or it was difficult to coordinate across departments, or the main responsible department was abolished and merged. (4) The lack of coordination, manifested in the lack of coordination between energy legislations of different levels, and the lack of mutual correspondence between the separated energy laws and other relevant laws.

### **3.2 DEVELOPMENT PRIORITIES OF CHINA'S ENERGY LEGAL SYSTEM**

According to the requirements of China's energy revolution plan, the system of laws and regulations in the energy field should be improved, and the energy field should be fully integrated into the track of the rule of law. The development of the energy legal system mainly involves the following three aspects:

First, formulate a basic energy law and improve the top-level design of the energy legal system. To solve the defects of the current China's energy legal system, such as duplications, incoordination and even conflicts among the rules, it is urgent to introduce a basic and comprehensive energy basic law. The basic energy law has been enacted for more than 40 years. In 2022, the State Council's legislative work plan include the draft energy law into 16 bills to be submitted to the Standing Committee of the National People's Congress for deliberation. The Energy Law will play a leading role in the development of the energy legal system, solve strategic, overall and fundamental problems in China's energy field, and focus on establishing the following basic systems: (1) Guide energy development and utilization activities through the coordination of strategies and plans, and promote clean

and low-carbon energy development. (2) Scientifically promote energy development and energy infrastructure construction and improve energy supply capacity. (3) Improve the universal energy service mechanism by the aim of guaranteed people's daily energy needs. (4) Comprehensively promote the drive of scientific and technological innovation, improve the level of energy standardization, and accelerate the progress of energy technology. (5) Support the reform of energy system and mechanism, and comprehensively promote the marketization of energy. (6) Establish an energy reserve system, strengthen emergency capacity building, and ensure energy security. (7) Strengthen the supervision and management of energy development and utilization in accordance with the law, improve the supervision system, and promote the modernization of the energy governance system and governance capacity.

Second, remove the obstacles of the system and mechanism, and promote the reform of energy marketization. China's energy sector is undergoing in-depth adjustment of the system and mechanism. The reform of electric power, oil and natural gas has been further promoted, and the reform work has been basically rolled out nationwide. It is urgent to pass legal constraints and institutional arrangements, clarify the legal status of market players, and establish unified market rules, standardize and fair competition order, and clear legal relations, to achieve high-quality energy development characterized by safety, efficiency, green intelligence, and development and sharing. At the same time, establish an energy governance system and modernization of governance capabilities that are compatible with an effectively competitive energy market structure and market system.

Third, promote green and low-carbon development and optimize energy structure and efficiency. The focus of modern energy security is gradually shifting from supply security to ecological security. Although the global energy supply is tight due to the new coronavirus epidemic

and the Ukraine crisis, the general trend of green and low-carbon energy transformation worldwide has not changed. Coping with climate change has become a global consensus, and accelerating the green and low-carbon transformation of energy is also the concerted action of all countries. New energy has become a key field for all countries to compete and invest, and it is the main battlefield of the new round of energy technology revolution and industrial revolution. In 2021, China proposes to shift from dual control of total energy consumption and intensity to dual control of carbon emission total and intensity, highlighting the policy orientation of controlling fossil energy consumption, encouraging and promoting the further accelerated development of renewable energy, accelerating the development of renewable energy and energy structure transformation, and then coordinate energy security and transformation. The green and low-carbon energy legal system is the key to optimizing the energy structure and improving energy efficiency.

## **4 LEGAL DEVELOPMENT OF RENEWABLE ENERGY IN CHINA**

The core of implementing China's energy strategy of Four Revolutions and One Cooperation is the development of renewable energy, and the green and low-carbon energy legal system also requires promoting the development of the legal system in renewable energy.

### **4.1 BASIC LEGAL SYSTEM OF RENEWABLE ENERGY IN CHINA**

The 2005 Renewable Energy Law is an important milestone in China's renewable energy development, which has put China's renewable energy industry on the fast track. In 2009, less than 10 days after the Copenhagen Conference, the Standing Committee of the

National People's Congress passed the amendment to the Renewable Energy Law. The Renewable Energy Law clarifies China's renewable energy development strategy and its roadmap, and the development and utilization of renewable energy is listed as a priority area of energy development, providing legal guarantees for China's renewable energy development. The law is divided into eight chapters and thirty-three articles, namely Chapter 1 General Provisions, Chapter 2 Resource Survey and Development Planning, Chapter 3 Industry Guidance and Technical Support, and Chapter 4 Promotion and Application, Chapter 5 Price Management and Expense Compensation, Chapter 6 Economic Incentives and Supervision Measures, Chapter 7 Legal Liability, Chapter 8 Supplementary Provisions. The Renewable Energy Law establishes the legal system of renewable energy, which mainly includes the following basic subsystems:

First, the total target system, that is, to clarify the proportion of renewable energy or its power generation in energy consumption or electricity consumption. Paragraph 1 of Article 4 of the Renewable Energy Law stipulates that the state takes the development and utilization of renewable energy as a priority area of energy development, and promotes the establishment and development of the renewable energy market by setting targets for the total amount of renewable energy development and utilization and taking corresponding measures. The 14th Five-Year Plan (2021-2025) for Renewable Energy Development pointed out that the long-term goal of 2035 is to further improve the above indicators on the basis that the proportion of non-fossil energy consumption will reach about 25% and the total installed capacity of wind power and solar power will reach more than 1.2 billion kilowatts in 2030. In 2025, the total consumption of renewable energy will reach about 1 billion tons of standard coal. During the 14th Five-Year Plan period, renewable energy will account for more than 50% of the increase in primary energy consumption. In 2025, the annual

power generation of renewable energy will reach about 3.3 trillion kilowatt-hours. During the 14th Five-Year Plan period, the increase in renewable energy power generation will account for more than 50% of the increase in electricity consumption in the whole society. The power generation will be doubled.

Second, the renewable energy planning system. Article 8, Paragraphs 1, 2, and 3 of the Renewable Energy Law stipulates that the competent energy department of the State Council shall, in conjunction with the relevant departments of the State Council, formulate a national plan for the development and utilization of renewable energy in accordance with the medium and long-term total targets for the development and utilization of renewable energy throughout the country and the development status of renewable energy technologies, and implement it after reporting to the State Council for approval. The relevant departments of the State Council shall formulate relevant plans that are conducive to promoting the realization of the medium- and long-term total target for the development and utilization of renewable energy throughout the country. The energy management departments of the governments of provinces, autonomous regions and municipalities directly under the Central Government shall, in conjunction with the relevant departments of the governments at the same level, formulate the development and utilization of renewable energy in their respective administrative regions in accordance with the national plan for the development and utilization of renewable energy and the mid- and long-term goals for the development and utilization of renewable energy in their respective administrative regions. After the planning is approved by the government at the same level, it shall be reported to the energy administrative department of the State Council and the national electric power regulatory agency for the record, and the plans shall be organized and implemented. Paragraph 1 of Article 9 stipulates that Paragraph 1 of Article 9 stipulate that the formulation

of plans for the development and utilization of renewable energy shall follow the principles of adapting measures to local conditions, considering overall considerations, rational distribution, and orderly development. Make overall arrangements for the development and utilization of renewable energy sources such as wind energy, solar energy, water energy, biomass energy, geothermal energy, ocean energy, etc. The planning content shall include development goals, main tasks, regional layout, key projects, implementation progress, supporting power grid construction, service system and safeguard measures, etc.

Third, the full amount of the guaranteed acquisition system. Article 14, paragraphs 2 and 3 of the Renewable Energy Law stipulates that the competent energy department of the State Council, together with the national electricity regulatory agency and the financial department of the State Council, shall, in accordance with the national renewable energy development and utilization plan, determine the proportion of renewable energy power generation that should be achieved during the planning period to the total power generation, formulate specific measures for grid enterprises to prioritize dispatch and full purchase renewable energy power generation, and the energy authority of the State Council, together with the national power regulatory agency, will be responsible for the supervision on the annual implementation. Power grid enterprises shall sign grid connection agreements with renewable energy power generation enterprises that have been constructed in accordance with the renewable energy development and utilization plan, have obtained administrative licenses in accordance with the law, or have submitted for recordation. This agreement includes the full purchase of on-grid electricity from grid-connected renewable energy grid-connected power generation projects that meet grid-connected technical standards within the grid company's grid coverage. Power generation enterprises are obliged

to cooperate with power grid enterprises to ensure the security of the power grid.

Fourth, classified electricity price system. Paragraph 1 of Article 19 of the Renewable Energy Law stipulates that the on-grid electricity price of renewable energy power generation projects shall be determined by the pricing authority of the State Council according to the characteristics of different types of renewable energy power generation and the conditions of different regions, according to the conditions conducive to promoting renewable energy. The principle of energy development and utilization and economic rationality shall be determined, and shall be adjusted in time according to the development of renewable energy development and utilization technologies. The on-grid electricity price shall be announced.

Fifth, the cost-sharing system. The full amount guaranteed purchase system and the classified electricity price system solve the problem of electricity sales and investment return of renewable energy power generation enterprises, but the high-cost expenditure of power grid enterprises must be solved by the cost sharing system. Article 20 of the Renewable Energy Law stipulates that if the cost incurred by a power grid enterprise in purchasing renewable energy electricity according to the on-grid price determined by Article 19 of this law is higher than the cost incurred by calculating the average on-grid price for conventional energy generation, the difference between the two shall be supplemented by the nationwide collection of renewable energy electricity prices for electricity sales. Article 21 stipulates that reasonable grid connection fees and other reasonable related expenses paid by power grid enterprises for the purchase of renewable energy power can be included in the power transmission costs of power grid enterprises and recovered from the sales price. Article 22 stipulates that the sales price of the public renewable energy independent power system invested or subsidized by the state

shall be subject to the classified sales price in the same region, and its reasonable operation and the part of the management fee exceeding the sales price shall be compensated in accordance with the provisions of Article 20 of this Law.

Sixth, the renewable energy development fund. Article 24 of the Renewable Energy Law stipulates that the state finance establishes a renewable energy development fund, and the source of funds includes the special funds arranged by the state in the fiscal year and the additional income from renewable energy electricity prices collected in accordance with the law. The renewable energy development fund is used for compensation for the difference in expenses stipulated in Articles 20 and 22 of this Law shall be used to support the following matters: (1) Scientific and technological research, standard formulation and demonstration projects for the development and utilization of renewable energy. (2) Rural and pastoral areas renewable energy utilization projects. (3) Construction of independent power systems for renewable energy in remote areas and islands. (4) Resource exploration and evaluation of renewable energy and construction of related information systems. (5) Promotion of local renewable energy development and utilization equipment chemical production. If the grid connection fee and other related expenses stipulated in Article 21 of this Law cannot be recovered through the sales price of electricity, the power grid enterprise may apply for a subsidy from the Renewable Energy Development Fund. The specific measures for the collection, use and management of the renewable energy development fund shall be formulated by the finance department of the State Council in conjunction with the energy and pricing department of the State Council. In 2011, the Ministry of Finance, the National Development and Reform Commission, and the National Energy Administration issued the Interim Measures for the Administration of the Collection and Use of Renewable Energy Development Funds.

## 4.2 DEVELOPMENT PRIORITIES FOR THE LEGAL SYSTEM ON RENEWABLE ENERGY IN CHINA

The development of renewable energy in China is an important part of China's energy revolution, and the construction of the rule of law focuses on the following three aspects:

First, promote the development of renewable energy based on the market. China's government is an important promoter of the development of renewable energy, but with the rapid expansion of the total amount of renewable energy, the financial succession is not only weak, but also the drawbacks are becoming more and more obvious. It is necessary to use the legal system to shape the market mechanism for the development of renewable energy: (1) Establish a market mechanism for renewable energy development. A project development and management mechanism based on market-oriented competitive allocation combined with market autonomy, give full play to the guiding role of price signals in the unified national electricity market system, and optimize the layout of renewable energy development and construction through market mechanisms. (2) Do a good job in the connection between the guaranteed purchase of renewable energy power and market-oriented transactions, improve the market-oriented price formation mechanism for wind power and photovoltaic power generation, promote technological progress and cost reduction, and stabilize investment expectations. (3) Improve the rules for renewable energy to participate in electricity market transactions, break down market and administrative barriers, and form a market mechanism that fully reflects the environmental value of renewable energy and competes fairly with traditional power sources. (4) Improve the green power certificate mechanism, promote the formation of green certificate prices by the market, and do a good job in the green certificate and renewable energy power consumption guarantee mechanism, the

connection of carbon trading, and further reflect the ecological and environmental value of renewable energy.

Second, vigorously develop distributed energy systems. The secondary energy supply dominated by electricity in modern society is mainly realized by centralized power generation and grid-connected operation, which is the product of the inherent scale and concentration characteristics of fossil energy development. Renewable energy has the characteristics of distributed distribution, low energy density, and intermittent and fluctuating energy conversion. It is compatible with distributed energy systems, that is, renewable energy is directly oriented to users, and energy is produced and supplied locally according to the needs of users. A variety of functions can meet multiple targets for medium and small energy conversion and utilization<sup>[12]</sup>. The distributed system of renewable energy has become an important method for China's poverty alleviation and rural revitalization. In 2020, the General Department of the State Council Poverty Alleviation Office and the General Office of the Ministry of Finance also issued the Guidelines on Actively Responding to the Impact of the New Coronary Pneumonia Epidemic and Effectively Doing a Well-Executed in Photovoltaic Poverty Alleviation and Promoting Income Increase. The measures to actively promote the distributed development of wind power and photovoltaic power generation mainly include: (1) Promote the distributed development of wind power in nearby areas, and rationally use land resources such as barren hills and coastal beaches. (2) Promote the integrated development of photovoltaic power generation in multiple scenarios. Promote the development and utilization of photovoltaics on the roofs of industrial parks, economic development zones, and public buildings. Actively promote

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<sup>12</sup> 张璐：《“双碳”目标对我国可再生能源立法的影响及其应对》，载《北方法学》2022年第2期。

the integrated development of photovoltaic buildings in new factories and public buildings, and vigorously promote the comprehensive utilization of photovoltaic-plus. Encourage agricultural (pastoral) solar complementation, fishery and solar complementation and other composite development models, and give priority to the use of coal mining subsidence areas and mine dumping. Prioritize the use of coal mining subsidence areas, mine dumps and other industrial and mining waste land and oil and gas mining areas to build photovoltaic power stations.

Third, focus on improving the storage capacity of renewable energy. Large-scale energy storage is undoubtedly the most targeted solution for the splicing of the fault between the intermittently fluctuating supply of renewable energy and the continuous and stable demand. From the perspective of application scenarios and their combination with business models, the application models of energy storage technology include the following four categories: centralized wind/photovoltaic power plants plus energy storage, thermal power frequency regulation services, grid-side energy storage, and user-side distributed photovoltaic plus energy storage. The development of energy storage technology and industry involves all aspects of the development of the renewable energy law, as well as management requirements in fire protection, environmental protection, land, grid connection, etc. It is a systematic project with structural functions in the field of renewable energy. China's renewable energy legal system should establish a special plan to make overall arrangements for the development of energy storage technology and industry, and build a clear-oriented legal system environment.

## 5 CONCLUSION

Since the 1990s, China has been working to establish a legal system covering both conventional and renewable energy sources to move towards market-oriented, low-carbon development and optimize energy mix and efficiency. Especially since 2005, China's renewable energy laws have been more closely linked with the world's energy policies, and the content of the system has been continuously optimized in terms of production, pricing, consumption and financial support. In general, the development of China's renewable energy legal regime depends on China's energy policy and global policy coordination. These laws and policies respond to revolutions in consumption, supply, technology, and regulatory regimes, highlighting the need for international cooperation. In the future, China will continue to improve relevant laws in light of its own development needs and international environmental and energy coordination.

技术科学知识在墨西哥能源转型规划中的社会应用

**A APROPRIAÇÃO SOCIAL DO CONHECIMENTO  
TECNOCIENTÍFICO NO PLANEJAMENTO DA TRANSIÇÃO  
ENERGÉTICA MEXICANA**

**THE SOCIAL APPROPRIATION OF TECHNO-SCIENTIFIC  
KNOWLEDGE IN THE PLANNING OF THE MEXICAN  
ENERGY TRANSITION**

Ezequiel Zárate Toledo (以西结·托莱多)



## 摘要

本文基于对能源作为工业社会中塑造政治权力的重要因素的分析，提供了理解可再生能源如何改变权力关系的要素。在分析了可再生能源公共政策在墨西哥的应用后，形成应用框架，有助于提高科学知识的社会占有率，以及上述公共政策的应用。

**关键词：** 可再生能源；领土；环境；公共政策

## RESUMO

A partir da análise da energia como elemento importante na formação do poder político nas sociedades industriais, este artigo fornece elementos para entender como as energias renováveis podem transformar as relações de poder. Após a análise da aplicação da política pública de energia renovável no México, propomos uma estrutura que ajuda a melhorar a apropriação social do conhecimento científico para melhorar a aplicação da referida política pública.

**Palavras-chave:** energia renovável, territórios, meio ambiente, políticas públicas.

## ABSTRACT

Based on the analysis of energy as an important element in shaping political power in industrial societies, this article provides elements to understand how renewable energies can transform power relations. Following the analysis of the application of the renewable energy public policy in Mexico, we propose a framework that helps to

improve the social appropriation of scientific knowledge to improve the application of said public policy.

**Keywords:** renewable energy, territories, environment, public policy.

## 1 INTRODUCTION

In this work I present some elements of an investigation on the way in which what is called the energy transition is being developed in Mexico; a process through which, given the depletion of fossil fuels, it is a question of moving to an energy system based on the exploitation of renewable energies. To give shape to this exposition, I first analyze the theoretical postulate that gives important weight to energy in the construction of political power. I then discuss how renewable energy is thought to reconfigure power relations built in the carbon age. Then I observe the way in which public policy is developed in Mexico regarding renewable energies, analyzing the case study of two regions; in the South of the Isthmus of Tehuantepec and in Yucatan. Finally, in my final comments I elaborate a proposal on how the environment and the territory could be a base from which a process of social appropriation of techno-scientific knowledge in the field of renewable energies can be consolidated that favors inclusive development in our country and in Latin America.

## 2 ENERGY AND POLITICAL POWER

In this work I follow the line of reflection that observes the alliances and ties that are generated in the process of converting a natural resource into a form of power. I rely on the concept of *Energopowe*, an analytical method theorized by Dominic Boyer that conceives

political power through the analysis of electricity and fuels. The term is an evolution of the concept of biopower developed by Foucault.

According to Boyer: The modern state and modern power have always sought to control and capitalize on the transformative power of energy... It is not a question of promoting naive materialism but of arguing that power over energy has accompanied modern power over life and the population from the beginning (Boyer, 2011).

The question is about recognizing that human life is increasingly strictly and unstable linked to infrastructures and habits of electricity and fuel use. Fuels and energy have influenced the forms of political power. The development of the concept of energopower does not happen by chance, but because a series of events (oil crises in the 1970s, recognition of the Anthropocene) have drawn the attention of anthropologists to the tensions between government institutions and energies.

In this sense, I evoke the thesis proposed by Timothy Mitchel in his book *Carbon Democracy*, where he describes the relationship between politics and energy. His proposal radically shifts our vision of the history of the 20th century: according to him, the contours and transformations of the political regimes that are said to be democratic have been determined by the geophysical properties of the main carbonic energies, coal in the beginning and then oil. According to him, the heaviness of coal, the need to extract it from the mines and load it onto trains for transport, gave its producers, that is, the mine workers, considerable power over the energy flows that fed the economy during the process of industrialization in the second half of the 20th century. Using the threat of interrupting them, they created unions and mass parties, which are at the origin of the first democracies of the modern era (Mitchell, 2013).

Facing competing forces, Western ruling classes sought to orchestrate a global energy transition from coal to oil. Indeed, thanks

to its fluidity, its lightness and its exceptional concentration of energy, oil (which began to establish itself as a primary source of energy in the first decades of the 20th century) made it possible to circumvent the networks and powers of the coal workers. Thus was created a routing system that is less labor-intensive, more flexible and international, and above all, much more controllable by states and multinationals. With oil, the collusion of economic and political interests built outside the control of the people becomes possible.

The abundance of oil allowed experts to build an economy detached from all limits and from nature. The economy as an object of calculation and a means of governing populations, according to Mitchell, did not emerge in the eighteenth century with political economy, nor at the end of the nineteenth century with the new economic science. Its appearance was made possible by oil; because the availability of abundant and cheap energy allowed economies to disregard the depletion of natural resources and allowed them to represent material life as a system of monetary circulation – circulation that could grow indefinitely without worrying about any physical limits. Economics became the science of money, which does not have as its object the material forces and resources of nature, or human labor. In other words, the oil-based economy made possible a form of politics that was both dematerialized and denatured, with heavy consequences today (Mitchell, 2013).

### **3 ENERGY, CLIMATE CHANGE AND PEAK OIL**

In effect, the combustion of this oil production has taken the carbon that was buried underground and spread it into the atmosphere, and this at an ever-faster rate. According to experts, more than half of the oil consumed since the creation of the modern oil industry in the 1860s, that is, one hundred and fifty years ago, was consumed in

just thirty years, between 1980 and 2010, according to experts. The carbon dioxide produced during this combustion has contributed to the warming of the planet's atmosphere and oceans, which threatens to cause catastrophic climate change.

After 150 years of continuously increasing supply, the era of abundant oil appears to be coming to an end. The planet consumes its oil reserves faster than it discovers new ones. According to experts, we have no proof that we will be able to find new sources of oil at a rate that could keep pace with the decline of existing wells. Between 1995 and 2005, only 40% of the oil consumed in the world has been replaced by new discoveries (Mitchell, 2013, p. 276).

Oil production from conventional sources seems to have reached or is close to peak production, with some estimating that this will happen in 2016 and the most optimistic in 2028. According to experts, the earth's fossil fuel reserves are not going to run out. But as oil and coal become more scarce, their extraction more and more difficult, the financial and energetic cost required for such extraction will end the era of fossil fuels.

Before that overview, the big question is how the political machinery conceived to govern the age of fossil fuels could survive the demise?

## **4 RENEWABLE ENERGIES, CONTROVERSY, AND TECHNOLOGICAL POTENTIALISM**

In relation to fossil energies and the modes of electricity production that accompanied the development of industrial capitalism, some method of energy production linked to alternative sources (wind, solar, etc.), seem to have the potential to reconfigure and displace the logics dominant (Rumpala, 2013).

Some authors consider that renewable energies may have the potential to configure networks and flows in energy production and consumption. It seems that they can reduce the weight of centralized logics and lead the population towards the appropriation of energy issues. In this sense, it reflects on the transformation processes of technological resources linked to renewables in sociopolitical capacities.

Usually, three processes of socio-technological transformation are evoked that renewable energies can incite in relation to fossil energies:

a. from centralization to decentralization: in the first, its operation is based on a series of centers in which they assume production and distribution from a network in which they are the nodes. In the second model, the decentralized one, there are really no centers, and production is established through less massive units. This model is based on a wide range of technologies that may have the advantage of using locally available energy, tending towards energy self-sufficiency at the local level, towards models of collective production that lead to territorial autonomy. Some current technological advances make this model credible.

b. from remoteness to proximity: Renewable methods offer the possibility of energy production on a smaller scale than large technical macro-systems, bringing production spaces closer to consumers. A priori, this can limit the monopolies of large companies, establishing a more symmetrical relationship between producer and consumer.

c. from dependence to self-sufficiency: Resorting to renewable energies in manageable ways at the level of individuals and communities could also have effects in terms of existential security, reduction of dependencies of citizens and communities on public operators or private... controlled almost directly by the users, the energy resource will ultimately become reintegrable into the lived world. The availability

of this energy could fight against energy precariousness and therefore favor development (Rumpala, 2013).

Currently, in many places, this displacement (or energy transition) is the subject of reflection by research centers, local and regional governments, public institutions, companies and civil organizations, which investigate this issue from the perspective of the sociology of networks and flows. Of the social construction of technologies as essential for innovation.

But, are we not falling into a technological or energetic determinism here, of thinking that each form of energy produces a corresponding type of policy? From the perspective of this theoretical school, it is argued that no form of energy determines the types of political organization, that energy in a field of uncertainty and not technical determinism, and that the development of solutions to future energy needs goes through the construction of new forms of collective life.

In this same order of ideas, some authors such as Yannick Rumpala (2013), propose to speak in terms of “technological potentialism”, which means reflecting in terms of updating conditions: adaptability of technologies, acceptability of the population and possibilities of appropriation. In other words, this potential is not defined by an essence, but by the way in which the actors are going to be able to open up or find new possibilities in technological advances.

Admittedly, it is very difficult to predict the effects to which technological developments may contribute. That is why they must be understood from the angle of “range of potentialities”, where the technological dimension is one dimension among others.

## 5 WIND AND RENEWABLE ENERGY POLICY IN MEXICO

The energy transition is taking place within the framework of the liberalization of national electricity markets. Specialists from many countries claim, in their national contexts, greater stewardship of the state through the consolidation of public powers capable of regulating interactions between private sectors and civil society.

In Mexico there are few signs that indicate that it is being generated by the public powers, a context that favors the social appropriation of the technological potentialities associated with renewable energies. Here, they have mainly supported large-scale wind projects developed by multinational companies, most located in the southern region of the Isthmus of Tehuantepec, where the group of largest wind farms in Latin America operates (Howe, *et. al.* 2016).

These projects have been guided within the framework of laws and regulatory instruments that have focused on solving technical and financial aspects. I briefly quote some of the programs, instruments and laws in chronological order.

In 2001, the 2001–2006 Energy Sector Program proposed to develop 1,000 MW of electricity through renewable sources. To do this, the Secretary of Energy encouraged “greater participation of the private sector and make use of different financing mechanisms such as those of the Global Environment Fund (GEF) and the United Nations Program for Development (UNDP)” in its program to combat climate change (Sener-GTZ, 2006).

In that same year, 2001, a technical instrument was established to regulate the integration of renewable energy projects into the national electricity grid called the Interconnection Agreement Model for Renewable Energy Sources, (essential for connecting renewable energy projects to the electricity grid national) that according to some analysts, “opened a window of opportunity for the development of

wind power projects in the form of self-supply of electricity” (Zárate, *et al.* 2019).

In 2005, the Law for the Use of Renewable Energy Sources was approved, “one of its most powerful instruments being the creation of a Trust that would grant temporary incentives to projects that generate electricity for public service.”

In that same year, 2005, the Large-Scale Renewable Energy Project began, funded by a donation of 70 million dollars from the GEF through the World Bank. According to this program, in the first stage, 20 million were allocated for the construction of a wind farm under the control of the CFE called La Venta III. \$5 million went to “technical assistance activities”. The other 45 million went to form the Green Fund, intended to compensate for differences in the cost of electricity generation that exists between conventional sources (Sener-GTZ, 2006).

In 2006, the Energy Regulatory Commission (public body in charge of regulating the energy market), launched the first call for the Open Season to reserve capacity for transmission and transformation of electrical energy. The “Open Season” is defined as a “mechanism that allows coordinating the work for the design, development and financing of transmission infrastructure to dislodge energy from the territories.”

In 2008, the Law for the Use of Renewable Energies and Financing for the Energy Transition and its regulations published in 2009, focuses on establishing general provisions to regulate the access of new electricity generation projects with renewable energies to the infrastructure of the CFE as well as the design of instruments for financing the energy transition. In short: subsidiaries, create green funds to compensate for the differences in the cost of electricity generation with conventional sources.

These laws and instruments do not help to instruct the projects in the territory, they do not function as a tool for consultation with the communities, nor do they transmit decision-making capacities to

them at the time of planning. On the other hand, they do not offer access to civil society for the appropriation of technological, economic or training resources to achieve true sustainable development.

Basically, these laws show a vision of social factors as an accessory when directing projects. We also observe this in the design of the Mexican Center for Innovation in Wind Energy (a project of the CONACYT-SENER-Energy Sustainability Fund (FSE), which although it recognizes an organizational (sociological) problem between the different institutions of the energy sector (a problem that if it is not solved, it would lead to the technological gap between Mexico and the industrialized countries becoming larger), the social factor has a modest place in the scientific-technological planning that they propose.

This is in contrast to the very dynamic research that has been carried out in recent years. One of the major lessons of this research is that the social is imposed as a factor as (perhaps more) important than technology in the development of wind farms.

This represents a notable shift in the role of social factors (and the social sciences) in the face of technological transformations. I now proceed to analyze some situations generated by the presence of wind farms in Mexico, specifically in the southern region of the Isthmus of Tehuantepec, where the group of largest wind farms in Latin America operates.

## **6 UNSTABLE MECHANISMS OF TERRITORIAL AGREEMENT**

As there are no laws or instruments that instruct the territorialization of wind farms, this leaves developers free to, often on the fly, build their forms of social agreement.

To reach the communities, the developers formed their public relations groups in which local leaders, public officials and, sometimes,

the franchises of the political parties at the local level participated. Through them, and using patronage practices, the developers tried to convince the peasants to use their land in exchange for benefits such as land rent, access to jobs derived from the construction and operation of wind farms and public works for the communities “ (Zárate, *et al.* 2021).

Subsequently, the different companies signed land reservation agreements with the authorities of the different ejidos in the region, particularly those located in the area of the core of the wind where most of the wind farms currently operate: La Venta, La Ventosa, La Mata and Santo Domingo Ingenio, as well as the municipalities of Juchitán, Unión Hidalgo and Espinal. Through these agreements—which were actually territorial occupation agreements (a legal instrument derived from the neoliberal agrarian reforms of 1992 that opened the possibility of privatizing the land)—, the ejido authorities transferred to the companies the rights of occupation and usufruct of the land. [Howe *et al.*, 2015].

For some inhabitants of these ejidos and municipalities, these agreements lacked legitimacy because they were made through deception and bribery of local authorities. In his signature, the majority of the population was excluded because the decision to usufruct the land to the companies was made, in the case of the ejidos, by the ejidatarios (citizens with agrarian rights) and many times only by their authorities, who did not have enough information about the projects (Zárate *et al.* 2019, 2021).

In this process of controlling the territory, the work of federal agencies such as the Agrarian Attorney’s Office (PA) and the National Agrarian Registry (RAN) was fundamental. In principle, the RAN provided developers with technical information on the territories and streamlined the procedure for issuing parcel certificates (essential for

signing usufruct contracts between developers and peasants), a policy provided for by the 1992 reforms.

In addition, the agrarian visitor — a PA federal official who must inform, advise and defend the Mexican peasantry and whose political weight is important in local life — acted in favor of the companies in the negotiation process, bending the political will of the peasants and the authorities who resisted signing the agreements.

However, starting in 2006, the process of building the wind farms gave rise to a series of conflicts between the companies and the population. These had to do with effects on the land not foreseen by the builders of the parks, the form of payment for the usufruct of the land and the distribution of other benefits, such as public works, employment, among others. In the absence of formal mechanisms to solve such conflicts, groups appeared to stand between the communities and the developers to negotiate a solution to the problems. In the absence of a response to their demands, these groups have found, in the forcible seizure of public facilities, communication routes or wind farms, a way of putting pressure on companies. In this situation, some of the latter feel “blackmailed” and accuse these groups of “inventing” problems to obtain benefits. On the other hand, the population complains about the intervention of these groups that hinder the effective solution of problems and centralize resources.

Finally, since 2012, we have seen the formation of a series of professional associations and unions (builders, construction and maintenance workers, carriers, security services) who, associated with landowners, are key in the game of powers associated with wind turbines. These groups act in a double game: on the one hand, they try to control the disagreements, often functioning as shock groups against the opponents of the parks, and on the other hand, they act against the developers when they feel that their demands are not resolved. The presence of these types of groups and the lack of a policy

to solve the aforementioned problems have led to the establishment of a kind of informal government that the development companies try to administer in a patronage manner, eroding, as we established, local governance systems.

Currently, in alliance with the developers, each ejido (the ejidatarios, often controlled by local caciques) decides on the installation of a park, there are no management plans, nor criteria that develop a broader vision of the effects on the ecosystem and populations on a regional scale.

Regarding the link with the regional teaching centers and research centers, according to the director of the Institute of Renewable Energies of the Universidad del Istmo, although there have been some collaborations between some development companies present in the region and this teaching center, this has been done without the mediation of a formal public policy. In some cases, some companies such as Acciona and Gamesa have financed experiments to manufacture low-power wind turbines. In this process, according to the director of this center, “students learn the essentials of how a wind turbine works”, which allows students to get jobs doing maintenance work in the parks. In other cases, the students elaborate their social service in the companies building the social acceptability of the technology towards the communities.

According to the Mexican Center for Innovation in Wind Energy (financed by the CONACYT-SENER-Energy Sustainability Fund (FSE)), it faces the secrecy of developer companies regarding the knowledge produced in their wind farms, “companies are governed by rules of international industrial protection, academics have little relationship with them, especially because they have their research centers in their own countries, here they are only bringing their technology, there is no law in the country that obliges them to transfer technology.”

## 7 CONCLUSION

If the energy transition directed through renewable energies offers some technological potential that can become political capacities to redirect the hierarchical development model (which has had strong repercussions on the environment) generated by oil, through greater participation of society on energy issues, the current scheme of Mexican renewable energy policy (particularly wind power) does not seem to favor this process. So far there is no formal strategy for capacity building for the population.

One of the ways to correct the current model is to include the criteria or policies that harmonically link aspects such as the environment, social factors and technology, outside the empty discourse of the promoters and public powers that currently promote energy projects. renewable. This implies a process of transmission of technological capabilities to the population, beyond the benefits they may obtain from income or other publica.

One of the most sensitive points is the one that refers to the process of defining the location of the parks, where the technical definition of the places is currently opposed against more identity definitions, symbolic of the impacted communities. It is then necessary to integrate other variables to find their reflexive capacities, their resilience, the meaning and non-commercial values attributed to their spaces.

This would make it possible to break that technocentric scheme mentioned above, as well as the split between experts (who centralize decision-making responsibilities on issues of public interest) and laymen. This would be an important step for the acquisition of knowledge as a means to build rationality, give meaning to projects and/or policies and their relevance in the development of the territories.

It would also make it possible to correct the current dynamic in which the citizenry is in the last place of decision-making, when the environmental manifestation is made known and everything is already decided.

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哥伦比亚的可再生能源和能源转型：  
进展和挑战

**ENERGIA RENOVÁVEL E ENERGIA DE TRANSIÇÃO NA  
COLÔMBIA: APORTES SOBRE AVANÇOS E DESAFIOS<sup>[13]</sup>**

**RENEWABLE ENERGIES AND ENERGY TRANSITION IN  
COLOMBIA: POINTS ON ADVANCES AND CHALLENGES**

John Zapata Ochoa (约翰·萨帕塔)



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<sup>13</sup> Translated into English by Marina Gomes Barbosa (瑪麗娜·戈麥斯·巴爾博薩).

## 摘要

伴随着可再生能源的日益普及，全球能源转型正在推动系统性的结构变革。哥伦比亚拥有丰富的自然资源，在能源转型过程中，可以为本国发展和外国投资者提供更多机会。为了使这些新兴企业更好发展，有必要建立一个监管框架，确保这些新兴企业和项目良性发展，同时保护生态系统和自然环境，实现可持续发展目标，履行《巴黎协定》和在格拉斯哥举行的第二十六届缔约方会议中所作的承诺。通过哥伦比亚公共政策的调整，促进和规范基于非常规可再生能源（USRE）项目的实施，以及全国非互联地区（NIA）的实施过程；通过分析哥伦比亚现有能源结构，探索向可再生能源转型的路径，形成该类能源市场监管的总体架构。此外，本文还简要介绍了《2020-2050年国家能源计划》中有利于实施可再生能源的相关政策。其目的在于构建哥伦比亚向可再生能源转型的总体架构，促进可再生能源项目发展和实现可持续性发展目标所需的政策和法规的出台。

**关键词：**能源转型；过渡能源；可再生能源

## RESUMO

A transformação energética global está impulsionando mudanças estruturais em todo o sistema, especialmente com a crescente adoção de energias renováveis. Países como a Colômbia possuem riquezas naturais que os colocam em uma posição favorável para aproveitar essa nova onda de transformação, tanto no desenvolvimento interno desses projetos quanto no atendimento aos interesses de investidores estrangeiros. Para possibilitar esses novos empreendimentos, é necessário estabelecer um marco regulatório que não apenas viabilize tais projetos, mas também proteja os ecossistemas e as comunidades que vivem

neles, em consonância com os compromissos assumidos nos Objetivos de Desenvolvimento Sustentável, no Acordo de Paris e na COP 26 realizada em Glasgow. Neste trabalho, propomos avançar por meio de políticas públicas colombianas que promovam e regulamentem a implementação de projetos de energia baseados em Fontes Não Convencionais de Energia Renovável (FNCER), assim como o processo de implementação em áreas não interconectadas (ZNI) em todo o país. Na primeira parte, abordaremos a composição da Matriz Energética colombiana, seguida por uma apresentação sobre como a transição para outras fontes de energia tem sido promovida. Por fim, forneceremos um esboço geral da regulamentação associada a esse mercado energético. Além disso, apresentaremos de forma resumida as políticas energéticas enfatizadas no Plano Nacional de Energia 2020-2050, que privilegiam a implementação das energias renováveis. Em resumo, este trabalho visa explorar o potencial da Colômbia na transição para uma matriz energética mais sustentável, destacando as políticas e regulamentações necessárias para impulsionar o desenvolvimento de projetos de energia renovável e alcançar os objetivos de sustentabilidade estabelecidos.

**Palavras-chaves:** Colômbia; Transição energética; Energia de transição; Energia renovável.

## ABSTRACT

The global energy transformation is promoting system-wide structural changes, especially with the increasing adoption of renewable energies. Countries like Colombia have natural resources that place them in a favorable position to take advantage of this new wave of transformation, both in the internal development of these projects and

in serving the interests of foreign investors. To make these new ventures possible, it is necessary to establish a regulatory framework that not only makes such projects viable, but also protects the ecosystems and the communities that live in them, in line with the commitments assumed in the Sustainable Development Goals, in the Paris Agreement and in the COP 26 held in Glasgow. In this work, we propose to advance through Colombian public policies that promote and regulate the implementation of energy projects based on Unconventional Sources of Renewable Energy (USRE), as well as the implementation process in non-interconnected areas (NIA) throughout the country. In the first part, we will address the composition of the Colombian Energy Matrix, followed by a presentation on how the transition to other energy sources has been promoted. Finally, we will provide a general outline of the regulation associated with this energy market. In addition, we will briefly present the energy policies emphasized in the National Energy Plan 2020–2050, which favor the implementation of renewable energies. In summary, this work aims to explore Colombia's potential in the transition to a more sustainable energy matrix, highlighting the policies and regulations needed to boost the development of renewable energy projects and achieve established sustainability goals.

**Keywords:** Colombia; Energy transition; Energy of transition; Renewable energies.

## 1 INTRODUCTION

Energy transformation implies structural changes throughout the system, even more so when the trend is towards renewable energies. Countries like Colombia have the possibility of entering this new wave of transformations because they have natural resources that put

them in favorable conditions both for the internal development of these projects and to meet the interests of foreign investors.

For this, then, it is necessary to generate the regulatory framework that allows these new ventures in the country and that, in addition to making this type of project viable, protects the ecosystems and the communities that inhabit them, in view of the commitment acquired within the framework of the Objectives of the Sustainable Development, the Paris Agreement and the COP 26 held in Glasgow. Thus, we propose in this work, to take a step through the Colombian public policies that promote and regulate the implementation of energy projects based on Unconventional Sources of Renewable Energy (USRE) and the process that the country had in its implementation in non-interconnected areas (NIA) across the country.

To achieve this, in the first part we will talk about the composition of the Energy Matrix, then present what is related to the way in which the transition to other sources has been promoted, to end with a general outline of the regulations associated with this energy market.

Finally, we present, quite succinctly, what the National Energy Plan 2020–2050 proposes, emphasizing energy policies that favor the implementation of renewable energies.

## **2 COLOMBIA'S ENERGETIC MATRIX**

Over the years, Colombia has undergone an energy transition that has consolidated hydroelectric energy as one of its main sources. In the 1960s, the energy matrix was composed as follows: firewood 51%, petroleum 28%, coal 17%, hydraulics (1.9%). Hydroelectric power was marginal and only in the 1970s did a planning process begin through which it gained such prominence that today it is the main source of energy supply for Colombian households. Firewood, although still used as an energy alternative in very remote areas, mainly for cooking

food, has practically disappeared as a main source. Coal also lost its share, and is in fact exported, becoming one of the biggest sources of revenue for the country's finances. Like hydroelectric energy, natural gas now has an important share (20%) in the national energy matrix.

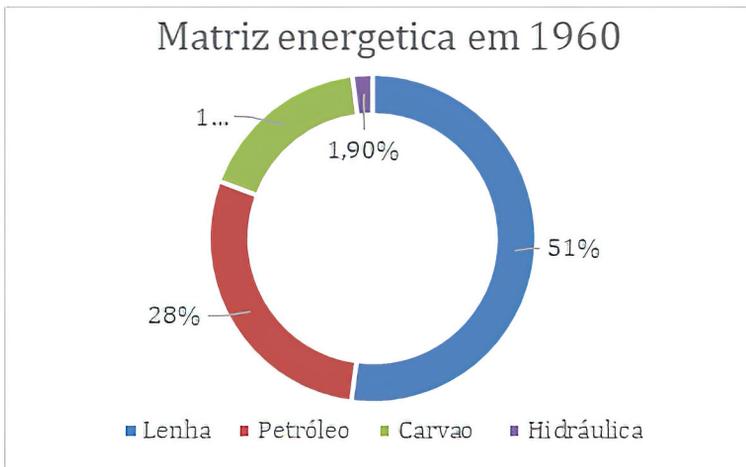
The country experienced, likewise most Latin American countries, an economic and productive transformation, which in turn was reflected in energy consumption. Between 1975 and 2019, Colombia increased its population from 24 to 49 million inhabitants, this population increase, combined with the economic and productive transformation, implied an increase in final energy consumption of 72,800,000 J to 134,600,000 J (UPME, 2020; p. 23). This also coincides with the concentration of the population in the main urban centers, where most of the industry and energy demand is located.

Colombia is a country that has a diversified energy matrix, it is an oil producer, but it is not an oil-based country. The composition of its matrix is in line with the rest of the world, where liquid fuels continue to be the most used sources, followed by natural gas and electricity. Within liquid fuels, oil continues to be the source with the greatest share, representing 35% of world supply; in Latin America this percentage reaches 41% and in Colombia 40%. Natural gas has a 20% share in the world, 18% in Latin America and 21% in Colombia. Electric energy has a share of 16% in Colombia, 15% in Latin America and 10% worldwide. It is in this type of energy that great expectations are generated in the energy transition, given the possibilities that the country has access due to the abundance of some of these non-conventional energy sources.

In terms of general composition, the greatest demand for energy is found in the transport sector which, according to data from the National Energy Plan, corresponds to 40% of total demand in 2018 (Idem. p. 26). This 40% comes mainly from fossil sources such as coal, oil and derivatives, natural gas, biofuel and electricity. The second

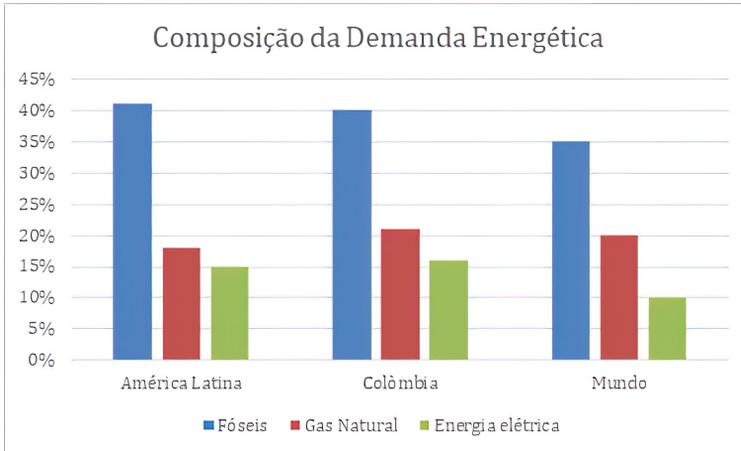
energy consumer in the country is the industrial sector, which holds a 22% share and whose main energy sources are natural gas (29%), mineral coal (28%), sugarcane bagasse (20%) and electricity (twenty percent). In contrast to Latin America, electricity demand in Colombia that comes from industry is 20% compared to the Latin American percentage average of 18% and is 7 percentage points below the world average. Coal continues to represent an important source for the world industry such as Colombia, whose shares are estimated at 29% and 28% respectively, in contrast to Latin America, which the use of this source represents 8%. With oil and its derivatives as an energy source, Colombia demands only 3% in the industrial sector against 19% in Latin America and 12% in the world (UPME, 2020; IEA, 2020).

**Graphic 1. Colombia's energy matrix in the 60s.**



**Source: self-elaboration based on EMPU (2020)**

**Graphic 2. Composition of energy demand in Colombia, Latin America and the World.**



**Source: self-elaboration based on EMPU (2020)**

The residential sector represents 20% of the energy demand, in which cooking food is the one activity that consumes the biggest amount of energy, representing 68% of final consumption. Even in our country, firewood and electricity lead energy consumption in households with a share of 37% and 35% respectively; this consumption is explained by its use in most rural households in the country. This issue reflects one of the great challenges in terms of access to other energy sources such as renewable energies. Natural gas also represents a demand of 20% in contrast to 7% for liquefied petroleum gas (LPG).

### 3 THE TRANSITION TO RENEWABLE ENERGIES

The generation goals with this type of so-called unconventional projects, which amount to 2,200 MW of energy, do not take into

account welfare indicators, but instead incorporate indicators of consumption and their profitability. The goal, more than anything related to the conservation of biodiversity and the improvement of the quality of life for all, is focused on the diversification of a market that has been dominated by interests that seek the accumulation of wealth. The incorporation of non-conventional sources of renewable energy is vital for energy security, guaranteeing access to service, decarbonising economies and supporting the 2030 agenda to address climate change. This contrasts with the contributions made by Roa, Soler & Aristizábal (2018), when they mention that this does not seem to be a general problem in Colombia, given that the country has one of the highest energy sufficiency index (ESI)<sup>[14]</sup> in Latin America, an ISE of 2.8, and which contributes no more than 1% to the total emission of Greenhouse Gases (GHG) in the world.

Around 70% of the electrical energy consumed in the interior of the country is derived from water. The richness of water and its relief are one of its main advantages to optimally use this gift of nature as a source of energy. It is also a country that, being in the equatorial zone, has very good sun incidence rate every day of the year, which has allowed it to take advantage of this potential for the development of photovoltaic energy in almost the entire country. For this reason, a transition to non-conventional renewable sources is one of the alternatives that are being explored to guarantee access to energy service in the Non-Interconnected Zones of the country.

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<sup>14</sup> The energy sufficiency index is obtained dividing the total production value by the total internal offer of energy (Soler, 2011). It is needed to import energy to satisfy the internal demand; countries with ESE equal to 1 could be in a condition of equilibrium or sufficiency, which is not common in our reality; and those countries with ESE higher than 1 have an energetic surplus, i.e., they could supply all their own internal demand and participate in the international energy market if they are interested (ROA, SOLER & ARISTIZABAL, 2017, p.119)

In the same way, it is up to Minminas to use these resources as financial support for the implementation of self-generation solutions on a small scale, through which people and establishments can generate their own energy and sell to NES energy that does not pay off, becoming a mechanism that boosts the Colombian electrical sector and gives greater reliability to the sector. The Institute for Planning and Promotion of Energy Solutions for Non-Interconnected Areas (IPSE) is the entity responsible for the implementation and promotion of sustainable energy solutions in the NIA. Its implementation is based on criteria of effectiveness, efficiency and effectiveness so that through the universalization of this service, the living conditions of the inhabitants of remote regions of the country are improved, promoting the use of renewable energies to meet the SDGs and with the commitments defined in the country. COP 26 held in Glasgow in 2021 and the commitments previously made at COP21 of the Paris Agreement.

This institute also fulfills the function of making technically and financially viable the projects that have the best electrical energy service in the ZNI presented by territorial entities and by Companies that Provide Electric Energy Service, as well as those presented through other sources of financing, as Construction for Taxes, royalties and International Cooperation.

Colombia, within the framework of political reforms and the issuance of new laws aimed at solving environmental problems, has a National Policy on Climate Change that began its formulation in 2014 and since then has proposed to articulate all the efforts that the country has made for several years, and mainly since 2011, through the Colombian Strategy for Low Carbon Development -CSLCD-, the National Plan for Adaptation to Climate Change -NPACC-, and the National REDD+ Strategy, among other initiatives, and adds new elements to strategically guide all efforts to fulfill the commitment acquired under the Paris Agreement. In addition, in 2017,

the Colombian government imposed a structural tax reform in which special emphasis was placed on the collection of a so-called “green tax” which, according to the Organization for Economic Cooperation and Development (OECD), must be implemented in all the countries of the world as an effective method to contain climate change.

The Law 1715 of 2014 was also enacted, which seeks to promote the development and use of Non-Conventional Energy Sources in the National Energy System (NES) through their integration into the electricity market, their participation in the NIA and other sources of energy, with special emphasis on renewable energies. This also implies efficient energy management, which includes both energy efficiency and demand response. This law also sought to establish the legal framework and instruments for the promotion and use of the FNCE, in order to comply with the commitments assumed by the country in terms of the implementation of renewable energy, efficient energy management and reduction of greenhouse gases emissions, as well as those acquired through the approval of the statute of the International Renewable Energy Agency IRENA, adopted by Law 1665 of 2013.

More recently, Law 2099 of 2021 establishes the conditions for the energy transition in Colombia, the process in which the revitalization of the energy market will be promoted and proposes how the country’s economic reactivation will take place based on renewable and non-conventional energies. It also dictates norms for strengthening public electricity, gas and fuel services. The Fund for Non-Conventional Energies and Efficient Energy Management (FNCEEM) is also created, with the objective of promoting, executing and financing plans, programs and projects for Non-Conventional Energies (NCE), especially non-renewable ones.

With this fund, the idea is to partially or totally finance the entire planning and execution process of projects that strengthen the National Interconnected System (NIS) and that in the Non-Interconnected

Zones (NIZ) energy projects of the NCE and Efficient Energy Management Energy, as well as the financing of Unconventional Renewable Energy Sources (URES) for the provision of residential public services, implementation of solutions in small-scale self-generation microgrids and for adapting public lighting systems to solar technology, among other items. This law, in turn, modifies and complements some of the provisions on renewable energy raised in Law 1715 of 2014.

In this way, the generation of tax incentives to encourage private investment in this bet has become very important. Thus, for civil individuals and legal entities (companies) in the area of energy production with NCE and Efficient Energy Management, including smart metering, these investors acquire the right to deduct from their net result, 50% of the investment made for the implementation of said project for a period not exceeding 15 years and the project must be certified as an NCE project through the Energy Mining Planning Unit (EMPU).

Thus, the necessary materials for the implementation of NCE projects such as machines, equipment, national or imported services, which are intended for the production, use and measurement of energy of the NCE, as well as the evaluation of potential resources and to advance other measures for the efficient use of energy, are exempt from VAT. In addition, these policies include exemption from the payment of customs duties (import taxes) for equipment, machines, etc., intended for investment or reinvestment in non-conventional energy projects, namely renewable ones, and which are not produced or manufactured by the national industry, for which the respective procedures are established. All of the above items are included in the regulatory framework in Table 1.

**Table 1. Public policies on the regulation of the Colombian energy market**

Resolução UPME 703 de 14 de dezembro de 2018 “Pela qual se estabelece o procedimento e os requisitos para obter a certificação que aprova os projetos de Fontes Não Convencionais de Energia (FNCE), com vista a obter o benefício da exclusão do IVA e da isenção de imposto tarifário de que tratam os artigos 12 e 13 da Lei 1.715, de 2014, e outras disposições são adotadas”.

Resolução UPME 703 de 14 de dezembro de 2018 “Pela qual se estabelece o procedimento e os requisitos para obter a certificação que aprova os projetos de Fontes Não Convencionais de Energia (FNCE), com vista a obter o benefício da exclusão do IVA e da isenção de imposto tarifário de que tratam os artigos 12 e 13 da Lei 1.715, de 2014, e outras disposições são adotadas”.

Resolução Minambiente 1.283, de 8 de agosto de 2016, “Pela qual são estabelecidos o procedimento e os requisitos para a emissão da certificação de benefício ambiental para novos investimentos em projetos do FNCER e Gestão Eficiente de Energia, para obtenção dos benefícios fiscais de que tratam. Artigos 11, 12, 13 e 14 da Lei 1.715 de 2014 e demais determinações são adotadas”.

Decreto 2.469 de 2014, “Pela qual são estabelecidas as diretrizes da política energética quanto à entrega de excedentes de autogeração”. Os referidos documentos podem ser acessados”.

Lei 1715 de 2014, “Por meio da qual se regulamenta a integração das energias renováveis não convencionais no sistema energético nacional”.

Lei 2.099 de 2021, “Por meio da qual são emitidas disposições para a transição energética, a revitalização do mercado de energia, a reativação econômica do país e outras disposições”.

Decreto 2106 de 2019, “Pelo qual são editados regulamentos para simplificar, suprimir e reformar papéis,

processos e procedimentos desnecessários existentes na administração pública”.

Decreto 1073 de 2015, “Pela qual é emitido o Decreto Regulamentar Único do Setor Administrativo de Minas e Energia”.

Decreto 421 de 2021, “Ao qual se acrescenta o Decreto 1073 de 2015, Regulador Único do Setor Administrativo de Minas e Energia, no que diz respeito às transferências do setor elétrico para municípios e distritos beneficiários”.

Resolução 1.283, de 2016, “Pela qual são estabelecidos o procedimento e os requisitos para a emissão da certificação de benefício ambiental para novos investimentos em projetos do FNCER e Gestão Eficiente de Energia para obtenção dos benefícios fiscais de que tratam os artigos 11, 12 e 14 da Lei 1.715 de 2014 e outras determinações são adotadas”.

Resolução 045 de 2016, “Pela qual são estabelecidos os procedimentos e requisitos para a emissão da certificação e endosso dos projetos FNCER, com vistas a obter o benefício da exclusão do IVA e da isenção de imposto tarifário de que tratam os artigos 12 e 13 da Lei 1.715 de 2014, e outras determinações são feitas.”

Resolução 181.272, de 2011, “Ajustando-se o procedimento de concessão de subsídios ao setor elétrico nas Áreas Exclusivas de Serviço das Zonas Continentais Não Interligadas e revogada a Resolução 180.195 de 2011”.

Resolução 180.919 de 2010, “Pela qual é adotado o Plano de Ação Indicativo 2010-2015 para desenvolver o Programa de Uso Racional e Eficiente de Energia e Outras Formas Não Convencionais de Energia (PROURE), seus objetivos, subprogramas e adotar outras disposições em a este respeito.

Resolução 182.138 de 2007, “Pela qual é editado o Procedimento de concessão de subsídios para o setor elétrico na ZNI”.

Resolução 091, de 2007, “Pela qual são estabelecidas as metodologias gerais de remuneração das atividades de geração, distribuição e comercialização de energia elétrica e as fórmulas tarifárias gerais para fixação do custo unitário da prestação do serviço público de energia elétrica na ZNI”.

E como mencionado acima, o Decreto 2.143 de 2015 e o Decreto 1.623 de 2015 também estão disponíveis no banco de informações.

Resolução 203 de 2020, “Pela qual são estabelecidos os requisitos e procedimento para acesso aos benefícios fiscais em investimentos em pesquisa, desenvolvimento ou produção de energia do FNCER”.

Resolução 196 de 2020, “Pela qual são estabelecidos os requisitos e procedimento para aceder aos benefícios fiscais de desconto de imposto de renda, dedução de renda e exclusão de IVA para projetos de gestão eficiente de energia.”

Resolução 045 de 2016, “Pela qual são estabelecidos os procedimentos e requisitos para emissão da certificação e endosso de projetos FNCER, com vistas à obtenção do benefício da exclusão do IVA.

**Source: self-elaboration based on EMPU (2020); FENOGE (2022).**

In addition to all these regulations, public energy policies in Colombia must stimulate the market with the participation of the public and private sectors, as well as the academia and other related agents. To this end, the following pillars were proposed: 1) Security and reliability of supply; 2) Mitigation and adaptation to climate change; 3) Competitiveness and economic development; 4) Knowledge and innovation (UPME; 2020). Each of these pillars is contemplated in the National Energy Plan with a vision towards 2050, which we will refer to later on.

## **4 NATIONAL ENERGY PLAN (NEP) 2020-2050 AND THE CHALLENGES OF COLOMBIAN ELECTRICAL SECTOR**

Colombia's National Energy Plan (CNEP) 2020–2050 is an energy planning exercise that projects what the country wants to achieve in terms of energy generation and what is the path to follow to achieve it. It is also an exploration of the possibilities that the country may have in terms of energy. It focuses on exploring the possibilities for consolidating the country as a generator of renewable energies, with broad participation from public and private sector companies with a long-term horizon. This instrument was built considering pillars such as: economic development, adaptation to climate change and the use of innovation.

Among the challenges that the NEP brings along is the development and planning of an energy transition that allows the fulfillment of the State's commitments in terms of GHG reduction, for which it was proposed to have a resilient energy system that contributes to the improvement of the quality of electrical energy service throughout the national territory, which must be an energy system with low GHG emissions. This means that CO<sub>2</sub> emissions associated with energy consumption in all sectors must be measured.

According to this instrument:

Para permitir o acesso a soluções energéticas confiáveis, com padrões de qualidade e preços acessíveis, são analisadas iniciativas relacionadas ao fornecimento de energia, ou seja, as possibilidades atuais de fornecimento (como geração com fontes hidráulicas, térmicas a gás e carvão e a exploração de hidrocarbonetos), e aqueles que poderiam entrar na matriz energética colombiana (fontes não convencionais de energia como eólica, solar, geotérmica, biogás, nuclear e outras fontes

de energia como o hidrogênio). Da mesma forma, são consideradas as iniciativas associadas à descentralização, como geração distribuída e armazenamento em pequena escala. Do lado da procura, identifica-se que os distritos termais poderiam desempenhar um papel neste objetivo (UPME, 2020; p. 65).

Likewise, this instrument proposes possible ways to achieve the NEP vision by 2050, which consists of “consolidating the energy transformation, with which the sustainable development of Colombia will have been made possible” (Ibid., p. 49). To this end, it is proposed that this transformation be characterized by the use of state-of-the-art technologies in both supply and demand, which implies reducing the technological gap both in primary energy production and in end use. Similarly, it seeks that the Colombian energy matrix by 2050 must have an important participation of URES and can fulfill its GHG reduction commitments. The adoption of digital technologies and the use of data to make investment, operation and maintenance and energy consumption decisions will be essential to obtain better performance and quality standards, which also becomes a goal to be achieved in the future. Finally, as part of the NEP vision, it is also expected that end users will have a greater share in accessing reliable energy solutions, with access to information on the determinants of their consumption and market share.

The NEP’s vision is also linked to the fulfillment of the SDGs and part of its purpose is that the electricity sector be an activator of Development in the sense proposed by this agenda. That is, it aims at reducing poverty, accessing energy solutions based on URES, favoring the protection of biodiversity, fostering economic growth with advances in social issues, access to public services and the guarantee of well-being conditions in the present in the perspective of not leaving anyone behind, that is, thinking about future generations.

This approach to the SDGs implies orienting public policies towards improving the quality of life for all people, with a particular focus on the most vulnerable citizens and groups located in both urban and rural Colombia. Although not mentioned in the document, this vision must take into account that by promoting different and better living conditions in the areas

Likewise, this instrument suggests possible ways to achieve the NEP vision by 2050, which consists of “consolidating the energy transformation, with which the sustainable development of Colombia will have been made possible” (Ibid., p. 49). To this end, it is proposed that this transformation be characterized by the use of state-of-the-art technologies in both supply and demand, which implies reducing the technological gap both in primary energy production and in end use. In a similar way, it seeks that the Colombian energy matrix by 2050 must have an important participation of URES and can fulfill its GHG reduction commitments. The adoption of digital technologies and the use of data to make investment, operation and maintenance and energy consumption decisions will be essential to obtain better performance and quality standards, which also becomes a goal to be achieved in the future. Finally, as part of the NEP vision, it is also expected that end users will have a greater share in accessing reliable energy solutions, with access to information on the determinants of their consumption and market share.

## **5 CONCLUSION**

Access to electricity is essential for the well-being of people who live both in cities that are more connected to the productive and economic dynamics and for those who live in the peripheral regions of the country, where, because they are not connected to the

NES, it is necessary to propose energetic solutions to improve their living conditions.

From the IPSE, very important efforts have been made so that these remote locations from the national economic life can have energy solutions, with a focus on URES. It is also important to indicate how fundamental it is to maintain a robust public policy that transparently channels the resources destined to the implementation of this type of initiative and that also seeks to diversify the energy matrix in the country.

The public energy policies in the country must have an approach that encourages joint work between the academia, the public sector, the private sector and communities, both from the more economically dynamic areas that are part of the NES, and those that are in the periphery regions of the country and are part of the NIA.

In some areas of the country, renewable energies represent an enormous potential for the development of URES's energy projects. These solutions can serve as a way to bring the electricity service to non-interconnected areas; In a similar way, they have been a source of territorial tensions, since indigenous and black communities are located in most of these territories, which have collective territories with titles protected by law and with which the dialogues for the development of these projects have not been sufficiently clear, since the benefits seem to remain only in the hands of market agents. It is necessary to look at this part, since, if public policies seeks to improve access and well-being based on this market dynamics, it is important to have those who eventually could be self-generators of this service.

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能源政策和可再生能源:巴西概览

**POLÍTICA ENERGÉTICA E ENERGIAS RENOVÁVEIS:  
O PANORAMA BRASILEIRO<sup>[15]</sup>**

**ENERGY POLICY AND RENEWABLE ENERGY:  
THE BRAZILIAN OVERVIEW**

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## 摘要

作为人类利益的主要驱动力，征服领土是能源使用演变的决定性因素，无论是用于增强武器还是用于导航，这构成了能源、风能等自然资源的首批使用形式之一。然而，随着时间的推移，技术发展速度不足以跟上人口扩张的步伐，而人口扩张对新商品和服务的需求越来越大。所有这些因素促成了无节制的经济增长，经济增长首次超过了人类的需求，但也带来了许多问题，主要是环境问题。对自然资源枯竭的认识导致世界范围内需要使能源矩阵多样化，以使其更清洁。出于这个原因，本研究旨在通过广泛的书目审查来呈现当前巴西的能源情景，特别是考虑到可再生能源的使用。考虑到这一点，内容分为三个主要部分，其中将讨论巴西流行的可再生能源、巴西能源矩阵和巴西的能源政策。得出的结论是，巴西的能源矩阵主要由可再生能源组成。然而，生产商仍然大量使用不可再生资源。因此，可以得出结论，环境意识和需要采用更可持续能源的意识不仅应该来自政府，还应该来自社会本身。

**关键词：** 能量矩阵； 可再生能源

## RESUMO

Como grande propulsor do interesse humano, a conquista de territórios foi um fator determinante na evolução do uso da energia, seja para o impulsionamento de armas ou para a navegação, que constitui uma das primeiras formas de uso de um recurso natural como energia, o vento. Contudo, com o decorrer do tempo, as evoluções tecnológicas não eram suficientemente rápidas para acompanhar o ritmo da expansão demográfica, que cada vez mais exigia novos bens e serviços. Todos esses fatores contribuíram para um crescimento econômico desenfreado, que

pela primeira vez suplantou as necessidades humanas, mas acarretou em inúmeros agravos, principalmente ambientais. A percepção acerca da esgotabilidade dos recursos naturais, ocasionou uma necessidade mundial de diversificação da matriz de energética, com o objetivo de torná-la mais limpa. Por esse motivo, o presente estudo tem por objetivo apresentar, por meio de uma extensiva revisão bibliográfica, o atual cenário energético brasileiro, especialmente face à utilização de fontes de energias renováveis. Pensando nisso, o conteúdo foi dividido em três partes principais, nas quais serão discutidas as fontes de energias renováveis em voga no Brasil, a matriz energética brasileira e a política energética no Brasil. Chegou-se à conclusão de que a matriz energética brasileira é composta, em sua maioria, por fontes renováveis. Contudo, os produtores ainda fazem uso muito forte de fontes não-renováveis. Assim, é possível concluir que a consciência ambientalista e o despertar sobre a necessidade de adoção de fontes de energia mais sustentáveis, devem partir não somente da via governamental, mas também da própria sociedade.

**Palavras-chave:** Matriz energética; fontes de energia renovável; Brasil.

## ABSTRACT

As a major driver of human interest the conquest of territories was a determining factor in the evolution of energy use, whether for boosting weapons or for navigation, which constitutes one of the first forms of use of a natural resource such as energy, the wind. However, over time, technological developments were not fast enough to keep pace with demographic expansion, which increasingly required new goods and services. All these factors contributed to unbridled economic growth, which, for the first time, surpassed human needs, but resulted

in numerous problems, mainly environmental. The perception of the depletion of natural resources has led to a worldwide need to diversify the energy matrix, with the aim of making it cleaner. For this reason, the present study aims to present, through an extensive bibliographic review, the current Brazilian energy scenario, especially in view of the use of renewable energy sources. With that in mind, the content was divided into three main parts, in which renewable energy sources in vogue in Brazil, the Brazilian energy matrix and energy policy in Brazil will be discussed. It was concluded that the Brazilian energy matrix is mostly composed of renewable sources. However, producers still make very strong use of non-renewable sources. Thus, it is possible to conclude that environmental awareness and awareness of the need to adopt more sustainable energy sources should come not only from the government, but also from society itself.

**Keywords:** Energy matrix; renewable energy sources; Brazil.

## 1 INTRODUCTION

Throughout human evolution, need has been the driving force for every stage of development. It is what makes man avid for innovations, for changing the course of history and the *modus operandi* of a given status quo, which demands energy. Therefore, this good, although intangible, is an indispensable element for the manufacture and movement of goods, objects, and utilities.

For these reasons, human strength can be considered the first form of energy, so much so that the regime of slavery constitutes a large part of the history of nations, which is justified by the racial issue and/or by who held the supremacy of domination of weapons of the era. In addition, another significant form of energy was the use

of animal strength, through domination, admonition, and adaptation of the various animal species to the most varied types of work, such as transporting loads and people (ALMEIDA, 2020).

As a major driver of human interest the conquest of territories was also a determining factor in the evolution of energy use, whether for boosting weapons or for navigation, which is one of the first ways to use a natural resource as energy, the wind. Another form of domination from a while back in time is the use of hydraulic energy in the mills, which drove water and allowed its use in agriculture.

However, at the time, technological developments were not fast enough to keep in pace with the demographic expansion, which increasingly required new goods and services. For this reason, the first phase of globalization took place in the 16th century, with the era of the great navigations, through which States sought wealth, boosted their internal market, and ensured territorial power. In the 17th and 18th centuries, a series of technologies emerged that transformed the use of natural resources for energy purposes (ALMEIDA, 2020).

Gradually, investments began to focus on large cities. Families, in search of better living conditions, left their lands towards the urban area, which culminated in an unexpected and large-scale population density, making urban centers feel overcrowded, causing the emergence of suburbs without urban planning, where precarious sanitation was common. Furthermore, mass production was not equivalent to consumption, meaning that consumers did not completely absorb production. The Market did not foresee the so-called “excess production,” for which there was no correct destination, making dumps common in the economic scenario.

All these factors contributed to unbridled economic growth, which, for the first time, surpassed human needs, but resulted in countless problems. Thus, the change in the look in relation to the environment and the formation of an environmentalist thought

based on the protection of natural resources took place through the Industrial Revolution itself, which united its discoveries and the ideal of revolution to the scientific truths that justified production.

In addition, other factors, such as the bad environmental implications of wars, mainly the Cold War (1947 - 1991), which produced intrinsic war related and nuclear risks, and the high and unrestrained rate of pollutants emitted by industrial society, led people and governments to realization that development was not being translated into quality of life, but into a real possibility of depletion of natural resources, giving rise to the need for their protection.

This perception about the depletion of natural resources and the containment of excess production, caused a worldwide need to diversify the electrical energy matrix, to make it cleaner, which would be safer and reduce environmental problems (RAMPINELLI; ROSA JUNIOR, 2012).

For this reason, the present study aims to demonstrate, through an extensive bibliographic review, the current Brazilian energy scenario, especially in view of the use of renewable energy sources.

## **2 RENEWABLE ENERGY SOURCES IN VOGUE IN BRAZIL**

Every human action has some kind of impact. The environmental effects of anthropic activities can be local or global, among which: deforestation, relocation of populations, the destruction of infrastructure assets, acid rain, vehicle emissions resulting from the use of fuels, among others. (ERBER, 2012). Therefore, to understand the theme discussed here, it is important to point out that there is no such thing as zero impact energy. The so-called “clean” energies, as renewable energies are dubbed, also have a certain environmental impact. What is taken into consideration is the balance between the existing options.

The period from 1920 to 1950 was marked by changes in Brazil. Araújo and Oliveira (2003) state that the acceleration of coffee exports and the growth of industrial production caused the internal increase in the demand for energy, every year, although the country still did not have the structure to meet it.

Moura (2016), when analyzing the period between the 30s and 60s, points out that there were still no duly constituted environmental policies or management for environmental issues in Brazil. At that time, the main objective was the exploitation of natural resources, with the issue of environmental protection being a superficial concern. This awakening only occurred at the end of the sixties, when Brazilian society began to feel the impacts of industrial pollution, caused by the country's emerging production activities.

Como resultado do crescimento que o país vivia, o governo optou por começar a investir na capacidade interna, desenvolvendo e criando políticas. É de se ressaltar que o contexto político possibilitou tais investimentos, bem como o cenário mundial e a demanda interna, levando à busca por um desenvolvimento autônomo. Como Lima e Bermann (2004) destacam, a exploração das fontes de energias renováveis no país deu-se, primeiramente, no intuito de escapar da dependência do petróleo, todavia, se tornou propícia para maior exploração e desenvolvimento das regiões devido a especificidade das instalações necessárias para a geração da energia (KORZENIEWICZ, 2021, p. 33).

To understand the process of harnessing each of these energies and their impact on the environment, it is necessary to differentiate between renewable and non-renewable energy. For a type of energy to be renewable or non-renewable, the source used to produce it must be considered. According to the National Electric Energy Agency (2020), energy sources are natural resources used to operate machinery

and equipment and to produce energy, such as water, coal, petroleum derivatives, biomass, wind, solar radiation, and natural gas.

While non-renewable energies become scarce as they are used, as they're sources have a finite and limited quantity, as is the case with uranium and fossil fuels (BOYLE, 2004), renewable energies can maintain themselves in the long run, since most of they're resources are infinite. On the subject, Lellis (2007) points out that:

Uma fonte é de energia renovável quando emprega como matéria-prima elementos que podem ser recompostos na natureza em um processo inesgotável, ou em processos cujas reposições são realizadas em curto prazo, ou, ainda, quando a fonte de suprimento é considerada inesgotável em longo prazo (como o Sol). Isso significa que a fonte de energia poderá durar para sempre, desde que se tenha o cuidado de recolocar na natureza aquilo que é retirado. Assim, fontes renováveis de energia são formas inteligentes de aproveitamento dos recursos do planeta. (LELLIS, 2007, p. 34).

According to the National Atlas of Electric Energy (2002), made available by ANEEL, the hydraulic source, for example, which transforms kinetic energy into electrical energy from the force of water, represents 63.5% of the energy consumption matrix.

The kinetic energy from the undulation of air masses, which is the case of wind energy, represents 8.9% of the energy matrix. According to BLAABJERG and MA (2017), wind energy has grown in the last 30 years, becoming one of the main modern sources of energy. Another important renewable energy source being used in Brazil is biomass, which consists in organic matter (animal or vegetable), that can be captured through the combustion of these organic materials, such as firewood, or through biofuels (KORZENIEWICZ, 2021).

Solar energy, in turn, has been sympathized by many Brazilians, who, by their own volition, install panels to capture sunlight to use in their homes. The photovoltaic energy system captures the electrical power of the sun's rays through plates, in which photovoltaic cells are integrated. Although it grew by around 92.1% in Brazil between 2018 and 2019, solar energy represents only 1.1% of our energy matrix (KORZENIEWICZ, 2021).

It is important to understand that the sustainability requirement goes beyond the efficient use of traditional production factors, as it requires that, to obtain results in the short term, the viability of those that will be achieved is not impaired. In addition, it involves “a segurança do suprimento, a acessibilidade dos produtos ofertados, a equidade social dessa oferta e, naturalmente, que as propostas sejam ambientalmente aceitáveis e economicamente viáveis [...]” (ERBER, 2012, p. 04). Most of the current production processes that make significant use of non-renewable sources, does not meet the requirement of sustainability, because in the medium and long term these resources tend to be depleted or come to cost more. The perception of its harmfulness to the environment, with potential for irreversible damage, has led to more conscious choices on the part of economic agents.

Assim, a questão ambiental, levantada há cerca de 60 anos pelo Clube de Roma, no âmbito do possível esgotamento de recursos naturais, e já mais dirigida para o meio ambiente na década de 1970, a partir da Conferência de Estocolmo, passou a constituir elemento fundamental de qualquer política energética conseqüente. Mais do que isso, a responsabilidade de cada país, de cada agente econômico, no tocante a impactos ambientais que levem à mudança de clima global tornou-se uma questão de caráter ético, que leva qualquer agente a ser passível de questionamento por qualquer outro que se perceba prejudicado por sua atuação (ERBER, 2012, p. 4).

Another key factor, as highlighted by Pietro Erber (2012), is the understanding that sustainable development also depends on socio-economic factors, such as enabling the expansion of energy supply networks, to serve those who live in remote areas. In most of these projects, sustainability is limited, as only part of their socio-environmental impacts can be avoided, given that “ao longo da cadeia de transformações que os produtos energéticos sofrem, da sua fonte até a obtenção da energia útil, sempre há emprego de matérias primas e consumo de energia de fonte não renovável” (ERBER, 2012, p. 04). Consequently, we return to the beginning of the discussion: aware of the widespread use of non-renewable sources, which, added to the limitations of gains due to increased energy efficiency, do not make clear the need to expand supply, it is necessary to choose between impacts of different natures and intensities, because there is no clean energy. Thus, when discarding a solution, the impacts of the one considered more acceptable should also be analyzed.

### **3 BRAZILIAN ENERGY MATRIX**

According to the work developed by the Energy Research Company, linked to the Ministry of Mines and Energy, the energy matrix is the set of energy sources available for energy generation. These sources are subdivided into renewable and non-renewable, but that is a discussion for later.

For now, it is necessary to understand the current energy situation in Brazil. According to the Statistical Yearbook of Electric Energy (2020) of the same company, energy consumption in Brazil can be divided into two types: captive consumption and free consumption, which are subdivided into eight classes: residential, industrial, commercial, rural, government, public lighting, public service and private consumer. Captive consumption is regulated by an energy distribution body,

while free energy consumption is purchased directly from generators, in which owners can negotiate both for the captive and free markets. Historically, regulated/captive consumption has been higher than free consumption, however, the latter has shown greater growth due to the ease of negotiation, making renewable energy sources more accessible (KORZENIEWICZ, 2021).

Consequently, the country's energy matrix is mostly composed of renewable energies, but it is necessary to differentiate between production energy matrix and consumption energy matrix to verify how they behave empirically in the Brazilian scenario.

As its name implies, the energy production matrix is responsible for indicating and quantifying the coefficient of inputs applied in energy generation. According to the National Electric Energy Agency (2020), primary energy is based on natural resources, which are considered in their chemical form, such as water, coal, oil, biomass, wind, and solar radiation. In turn, oil, natural gas, and firewood are considered in themselves (directly).

According to studies carried out by the National Energy Balance (2020), which analyzed the production of primary energy in Brazil from 1970 to 2020, until the 2000s, Brazil was the country most committed to having an energy matrix mainly composed of renewable energies. However, after this period, with the large-scale exploration of the Pre-salt, oil production grew, so that in 2019 it represented 44% of primary energy production, so that, in all, non-renewable energies represented 59 % of production.

Despite this, the study also found an increase in the production of renewable energy for consumption, so much so that in 2017, “o Brasil ocupava o 3º lugar em capacidade instalada de geração hidrelétrica no mundo, atrás da China e Estados Unidos e o 7º lugar em geração por fontes alternativas no mundo, sendo os três primeiros China, Estados Unidos e Alemanha” (BEN Interativo, 2020, p. 23).

However, this production has foreign trade as its main target, and not domestic consumption.

Still on the international scene, Krell and Souza (2021) found that, while the Brazilian energy matrix in a broad sense is mostly composed of renewable sources, in the rest of the world renewable energies represent only 1.5% of global energy generation. In turn, according to Berni (2018), from a Latin American perspective, Brazil is the third country with the highest share of renewable energies, behind only Paraguay (67%) and Uruguay (54%). As for the energy consumption matrix itself, according to the 2020 statistical yearbook of electricity, the main energy consumption matrices were hydraulic sources (63.5%), natural gas (9.6%), wind energy (8.9%), biomass (8.3%), nuclear energy (2.6%), mineral coal (2.4%), petroleum derivatives (1.3%), solar energy (1.1%) and others (2.3%).

Based on the scope discussed so far, we will analyze the assumptions that guide energy policy in Brazil.

## **4 ENERGY POLICY IN BRAZIL**

According to Freitas and Silveira (2022), services related to the energy sector in Brazil date back to the 19th century, from the creation of the first power plant installed in the city of Campos (Rio de Janeiro), in 1883, and the first hydroelectric plant in Diamantina (Minas Gerais), soon after. Since then, these services have been evolving and improving, and today the second largest hydroelectric plant in the world is the Itaipu plant, whose domain is divided between Brazil and Paraguay.

As already presented, Cavalcanti *et al.* (2010), also bring the idea, which can be verified through the most diverse studies, that the growth of a country is related to the increase in the demand for energy. For Camargo, Ribeiro, and Guerra (2008), for example, this demand

can raise and determine the quality of life, through possibilities in the areas of education, health, food, leisure, social integration, social inclusion and others.

By analyzing the distribution of electricity service indices and the map of human development indices (HDI), most places with the lowest HDI also have the lowest electricity service indices, which highlights the relationship between energy consumption and economic development (FREITAS & SILVEIRA, 2022).

In this vein, considering the provisions of article 10 of Law No. 7,783, which lists water treatment and supply as one of the social services or essential activities; the production and distribution of electricity; gas and fuel – it can be concluded that access to electricity is fundamental for the promotion of a more just and egalitarian society.

According to Pietro Erber (2012), director of the National Institute of Energy Efficiency (INEE), an economic policy that aims to develop sustainably will prioritize the efficient use of production factors. In addition, it should be governed by two objectives: energy efficiency and the reduction of environmental impacts.

To this end, it is necessary to give priority to the use of renewable and locally sourced energy sources, in addition to guaranteeing energy availability embodied in itself, according to the characteristic of the source and the need to consider the scenario of the internal and external energy sector, the investments made and the limitations imposed by the availability of resources, be they financial, technological or human.

Another prominent issue when it comes to reducing environmental impacts and increasing efficiency in the production and use of energy is the reduction in the use of energy resources considered primary. For this, users need to be encouraged to use them efficiently, not only for the purpose of reducing fees to be paid, but also out of real concern for the environment. Consequentially, by using both natural resources and other production factors efficiently,

there will not only be a reduction in the cost of energy, but it will also increase the competitiveness and sustainable development of the country (ERBER, 2012).

Brazilian energy policy is currently governed at a central level by the provisions brought by Law 9478/1997, whose objectives were to legislate on national energy policy, activities related to the oil monopoly, institute the National Council for Energy Policy and the National Petroleum Agency, on which it determines:

Art. 1º As políticas nacionais para o aproveitamento racional das fontes de energia visarão aos seguintes objetivos:

- I - preservar o interesse nacional;
- II - promover o desenvolvimento, ampliar o mercado de trabalho e valorizar os recursos energéticos;
- III - proteger os interesses do consumidor quanto a preço, qualidade e oferta dos produtos;
- IV - proteger o meio ambiente e promover a conservação de energia;
- V - garantir o fornecimento de derivados de petróleo em todo o território nacional, nos termos do § 2º do art. 177 da Constituição Federal;
- VI - incrementar, em bases econômicas, a utilização do gás natural;
- VII - identificar as soluções mais adequadas para o suprimento de energia elétrica nas diversas regiões do País;
- VIII - utilizar fontes alternativas de energia, mediante o aproveitamento econômico dos insumos disponíveis e das tecnologias aplicáveis;
- IX - promover a livre concorrência;
- X - atrair investimentos na produção de energia;
- XI - ampliar a competitividade do País no mercado internacional (BRASIL, 1997).

Its body emphasizes, as already discussed, the importance of sustainability and preservation of the environment, the use of renewable

energies and the efficient use of the energy matrix, however, it failed to clearly discriminate the essential aspects of economy, social policy and environment, being necessary, according to Erber (2012), to reformulate the energy policy according to the available natural, economic, technological and human resources.

It is important to discuss that, although Brazil has natural resources varied in quantity and type, it still faces such a shortage of capital that it lacks, including those necessary for its exploitation and the expansion of its infrastructure and improvement of quality, living conditions and productivity of its internal sectors. The need to prioritize investments in education, health and other fundamental rights removes the possibility of greater investments in other equally critical issues, but considered less emerging, such as the energy issue itself. Therefore, efficient planning and management are essential for the country to achieve high rates of economic and social expansion. The sustainability of this entire process will allow for the promotion of better income distribution and the well-being of the population. (ERBER, 2012).

For the implementation of an efficient energy policy, it is important that its objectives are aligned with the country's economic and social policy. Specific objectives need to be outlined in accordance to the demands of other sectors, prioritizing factors such as poverty reduction, access to electricity and sustainability in the exploitation of these resources, so that there is no waste. It is also emphasized that this planning cannot disregard the demands and the effects-causes of social factors in the international political-energetic scenario.

In a general panorama, the current energy situation in Brazil is quite favorable, which is due to the participation of renewable sources, therefore, it is necessary to analyze which natural resources the country can, in fact, count on. As highlighted by Erber (2012), it is predictable that there will be a reduction in the share of hydroelectricity, due to

the depletion of its use and its significant socio-environmental impact. In addition to hydroelectric plants, there may be a reduction in the share of biomass, also due to its productive limitations, energetically speaking. Nuclear energy, in turn, may regain its relevance for having a minimal impact on global warming. In relation to wind and solar energy, these may play a more relevant role, as they are considered intermittent sources, that is, they cannot be stored in their original form, do not have the capacity to regulate, which will need to be complemented, either by hydroelectric, thermoelectric or natural gas plants.

However, from a global perspective, there is no sign of a significant reduction in the quantities currently used of fossil fuels, although it may decrease. Therefore, it is important to increase its efficiency along the energy chains.

In short, with environmentalist thinking in full swing and with the theme of sustainability in vogue, Erber (2012) states that energy security prioritizes the exploration of renewable sources and fuels available in the national territory, in addition to their use in a rational and efficient way. This efficiency, if achieved, would postpone the depletion of low-cost non-renewable energy sources, reducing the need for investments. Thus, the energy policy would affect the characteristics of the sectors of the economy, promoting the access of the most vulnerable sections of the population to a more favorable energy situation, producing quality of life.

## **5 CONCLUSION**

As discussed, the perception of the depletion of natural resources has given rise to numerous developments on the international scene, one of them concerning the energy issue, whose demand has become increasingly preponderant, given the unbridled economic growth.

This new perspective gave light to the central dichotomy of current economic issues: economic growth x sustainable development.

Through the contextualization of environmental policies and the understanding of the global and national scenario, environmental energy policies were/are shaped based on what is in vogue in the world and in the economy, through the need to adapt to the market, global needs and trends of development, which are aimed at improving the quality of life in the long term.

As Brazil is a country rich in natural resources, an energy matrix with a predominant use of renewable energy is viable, although its success does not depend only on the natural availability and potential of these resources, but also on a deeper knowledge about their potential.

It is possible to observe that the environmental awareness and the awakening of the need to adopt more sustainable energy sources, should start not only from the government, but also from society itself, through the valorization of the energy matrix. The possibility that half of Brazil's primary energy could come from renewable sources must be explored, preserved, and reinforced. However, this advantage has often been usurped in favor of the use of fossil fuels in the productive strata.

In this way, the sustainability of the full use of the energy matrix at our disposal requires the rational and efficient use of primary renewable sources, to promote the reduction of pollutant emissions. In addition, increasing energy efficiency and the use of renewable primary sources depends on fiscal, financial and price policies that reflect their priority. It is necessary to constantly reflect on the impacts of production costs, damages, and benefits of using these resources on society, so that sustainable development is always in view of governments and people.

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可再生能源和巴西风力发电合同的法律制度

**ENERGIAS RENOVÁVEIS E O REGIME JURÍDICO DOS  
CONTRATOS PARA GERAÇÃO DE ENERGIA EÓLICA NO BRASIL**

**RENEWABLE ENERGIES AND THE LEGAL REGIME OF  
CONTRACTS FOR WIND POWER GENERATION IN BRAZIL**

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## 摘要

巴西蕴藏着巨大的可再生能源，并在全世界居于前列。巴西的可再生能源生产集中在四个来源：水力、生物质、风能和太阳能。目前，风电场和光伏发电厂越来越重要，2022年合计占发电量的15.02%（ANEEL，2022），因此占用大片地区对能源生产至关重要。由于缺乏具体的法规，土地使用一直是通过土地租赁协议和土地使用转让合同进行的，并由传统的《土地法》加以规范。为了揭示农业合同制度对巴西可再生能源生产，特别是风能生产的后果、影响、矛盾和问题。本文通过实地调查和信息采集，对2018年之前的22份相关合同进行分析与梳理。

**关键词：** 可再生能源；合同；法律制度

## RESUMO

A matriz energética brasileira se destaca em relação ao resto do mundo pela elevada participação de fontes renováveis de energia. A produção de energia renovável tem se concentrado em quatro fontes: hídrica, biomassa, eólica e solar. Atualmente, as fontes eólica e solar vêm ganhando importância, representando juntas, em 2022, 15,02% da geração de energia (ANEEL, 2022). Em ambos os casos, a apropriação de vastas áreas é fundamental para que ocorra a produção de energia. Em decorrência da falta de regulamentação específica, o acesso à terra tem se dado por meio de contratos de arrendamento agrário e de cessão de uso, regulamentados pelo Direito Agrário. A fim de revelar as consequências, impactos, contradições e problemas decorrentes dessa adaptação do regime de contratos agrários à produção de energia renovável no Brasil, especialmente a eólica, apresentaremos uma breve análise de 22 contratos de arrendamento eólico aos quais

tivemos acesso até 2018. Além disso, nossa análise também se baseou em informações obtidas em trabalho de campo e em reportagens jornalísticas veiculadas sobre o tema.

**Palavras-chave:** Energia renovável; Contratos; Regime Jurídico.

## ABSTRACT

The Brazilian energy matrix stands out compared to the rest of the world due to the relevant participation of renewable energy sources. The production of renewable energy in Brazil has been concentrated in four sources: hydro, biomass, wind and solar. Currently, wind farms and photovoltaic plants have been gaining importance, representing together in 2022 15.02% of power generation (ANEEL, 2022). In both cases the appropriation of vast areas is essential for energy production to occur. Due to the lack of specific regulation land access has been taking place through land lease agreements and contracts for the assignment of land use, traditionally used in Agrarian Law. In order to reveal the consequences, impacts, contradictions and problems arising from this adaptation of the agrarian contract regime to renewable energy production in Brazil, especially wind energy, we will present a brief analysis of 22 contracts to which we had access until 2018. In addition, the analysis is also based on information obtained in fieldwork and in the local media.

**Keywords:** Renewable energies; Contracts; Legal regime.

## 1 INTRODUCTION

The Brazilian energy matrix stands out compared to the rest of the world due to the relevant participation of renewable energy sources, which add up to a total of 44.7% compared to 55.3% of non-renewable energy sources (EPE, 2022). The production of renewable energy in Brazil has been concentrated in four sources: hydro, biomass (thermal), wind and solar (photovoltaic). The latter represents a new frontier of renewable energy exploration (JENSS, 2021), which is expanding rapidly, and indicates that its part in the electricity matrix should increase in the coming years. Currently, wind farms account for 12% of power generation (ANEEL, 2022), while photovoltaic plants represent 3.02% of this segment (ANEEL, 2022).

In all cases the appropriation of vast areas (land/soil) is essential for energy production to occur, whether for the capture of natural resources such as water, wind or solar radiation, or for the production of sugar cane, which will later be used to generate electricity or to produce biofuels. Most of these sectors already have robust regulations in the Brazilian legal system. It should be noted that land leasing contracts by small, medium and large landowners to capitalists engaged in the production of sugar cane is a very old practice in Brazil and is regulated as an agricultural lease, regardless of the purpose for which the sugar cane produced will be used, whether for the production of sugar, alcohol or electricity.

Since the mid-2010s, we are witnessing the advent of the massive deployment of wind farms, especially in the Northeast region of the country. The same phenomenon is also occurring with photovoltaic energy, which is expanding rapidly, on its own and in association with wind generation. In these cases, as there is no prior specific legal provision regarding the ownership of the resource (wind and solar radiation) and the form of land appropriation for access to these natural

resources, the companies that operate in wind power and photovoltaic energy generation started to make adaptations to the legislation in force in the country, so that access to land has been given, mostly, from land lease agreements and contracts for the assignment of land use, traditionally used in Agrarian Law. However, this is not the proper contractual modality for this, since it does not take into account the specificities of these new forms of land (soil) use, nor the consequences of these new categories of use for their owners.

In order to reveal the consequences, impacts, contradictions and problems arising from this adaptation of the agrarian contract regime to renewable energy production in Brazil, especially wind energy, we will present a brief analysis of the contracts to which we had access. Access to the contracts is very difficult, since they contain secrecy clauses and impose fines for non-compliance on those who reveal their contents, restricting public access to them. It should also be noted that the contents of the contracts of the same company are often identical, differing only in the calculation of the amounts paid as leases to their owners. Thus, by analyzing a single contract document belonging to the same company, we are analyzing, in general terms, almost all the contracts practiced by the same company. Furthermore, the restrictions and limitations imposed on landowners, even in contracts from different companies, are very similar, which allows us to make some generalizations.

Initially, our analysis was based on the 22 contracts to which we had access until 2018 (TRALDI, 2019), information obtained in fieldwork and information made public by the documentary film *Wind Energy: the hunt for the winds* (BAUER, 2013). However, we have recently had access to more contracts that differ in nothing, or almost nothing, from those initially analyzed. As stated earlier, due to the order of expansion, the contracts for wind generation precede the contracts for photovoltaic generation. Thus, in many cases, the

latter have been prepared based on the terms of the wind generation contracts, which, in many others, have been amended to include photovoltaic generation, allowing the exploration of the same area for the production of electricity by both sources and, therefore, imposing new limitations on landowners. Among the contracts analyzed in this work are lease contracts from the following companies: Renova Energia, for land located in Caetité (BA) (one contract); Voltalia Energia do Brasil, for land located in the municipality of Serra do Mel (RN) (one contract); CPFL Renováveis (signed by the intermediary Companhia Valença Industrial and Casa dos Ventos), for land located in the municipalities of João Câmara (RN) and Parazinho (RN) (19 contracts) and Gestamp Eólica, for land located in the municipality of João Câmara (RN) (one contract)<sup>[16]</sup>.

## **2 ELEMENTS OF THE CONTRACTUAL RELATIONSHIP FOR WIND POWER GENERATION**

The relationship between a land owner and a wind generation company begins when the company interested in investing in the activity starts to search for land with wind potential for exploration. Once the land is found to be suitable, the company must acquire the property or sign a contract with the landowner to start measuring the winds (pre-operation phase/study period), which must occur for a minimum period of three years (ANEEL, 2009). Wind generation companies have signed a single lease agreement that contains clauses

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<sup>16</sup> The contracts of Renova Energia, Voltalia Energia and Gestamp Eólica and one contract of CPFL Renováveis (Valença Industrial) can be accessed in full at Traldi (2019, p. 330-378). The other contracts can be accessed at: Aneel Procedural Consultation, case no. 48500.001161/2010-96, volume 00002, p. 122-127; case no. 48500.001159/2010-17, volume 00002, p. 161-167; and case no. 48500.001160/2010-41, volume 00002, p. 179-185.

regulating the study phase (measurement) and the operation phase. Thus, when starting the measurements, the companies already have their right of access to the property guaranteed in case they win a public generation auction.

Lease agreements for the implementation of wind farms are bilateral contracts, governed by the rules of private law, i.e., only the parties involved participate in them, with no interference from the National Agency of Electric Energy (ANEEL) or any federative entity of the Brazilian State (TRALDI, 2019). Rural lease agreements, on the other hand, in their form and content, are governed by Brazilian law, especially by the Land Statute (BRASIL, 1964) and Decree No. 59,566 (BRASIL, 1966), which regulates it. This means that the contractual clauses can not be contrary to what is established in the legal system.

According to Article 3 of Decree No. 59,566/1966, the rural lease is the agrarian contract by which a person undertakes to cede to another, for a fixed time or not, the use and enjoyment of rural property, part or parts thereof, including or not, other goods, improvements and or facilities, in order to be exercised activity of agricultural, livestock, agro-industrial, extractive or mixed exploitation, for certain consideration or rent. According to Hironaka (2019), the Brazilian constituent made an option to create a protective system in favor of the non-owner producer (lessee) and the social function of the agrarian property, which justifies that the Brazilian Agrarian Law has as a rule a protective bias, which aims to ensure the protection of those people who are more socioeconomically fragile in the legal relations established by the rural lease agreement (the lessee). In these terms, the non-owner producer (rural worker) is understood to be the weakest party in the contractual relationship, hyposufficient, because wanting to work and not owning land, he must submit himself to a rural lease agreement.

However, unlike the institute described by Hironaka (2019), in lease agreements for wind power generation, the hipossufficient party is not the lessee (wind power generation companies), but the lessors (land owners). The Brazilian legislation that disciplines rural leases precedes the *boom of wind* farm implementation in Brazil and, therefore, was not able to foresee this legal situation. Hence, if the legislation had the objective of protecting the hyposufficient party in the contractual relationship, in the current model it benefits the power generation companies with a protection that should have fallen upon the owners of the rural land/property. Thus, wind generation companies end up subjecting the lessors (land owners) to an even more fragile condition. In order to show the lessors' (landowners') insufficiency, we will briefly analyze the main contractual clauses.

## **2.1. THE CONTRACTUAL FORUM AS A LIMITING FACTOR IN ACCESS TO JUSTICE**

In the contracts analyzed it was common to find situations in which properties located in the countryside were leased for wind generation, but the elected forum for judicial discussion of the contract was located in the capital. Bauer (2013) found situations in which wind farms installed in the semi-arid region of Bahia, for example, elected as venue municipalities located in the state of Rio Grande do Sul, which is approximately 2,650 km from the location of implementation/operation of the wind power plant, or even in other countries, depending on the company. According to clause X, article 12 of Decree 59,566 of 1966, the lease agreement must indicate the contract's forum (elected forum). Thus, any disagreement between the parties must be resolved in the common justice system at the location indicated in the contract.

Although the winds suitable for the production of wind energy are concentrated in points and patches of the semi-arid northeastern region, the negotiations regarding this activity and the resolution of conflicts concerning it are often held in places far from where the energy is produced, almost always at the headquarters or offices of the companies that control the plants. Even though the choice of forum in the contract in cases of rural leases is not contrary to Brazilian law, by allowing the election of the competent forum for discussion of the contract, the Brazilian legal system makes it difficult for the owners of land leased for wind power generation to challenge what in court. This is because it assumes that the companies (lessees) and the owners (lessors) will decide the competent forum together. However, the companies have more power to impose their will in the delimitation of the forum to discuss the contractual clauses or even the contract in its entirety. This power also derives from the owners' hypossufficiency in this contractual relationship. In this sense, we believe that the election of a different court than the one where the property is located, or the nearest court to the property, can be configured as an impediment to the owners' access to justice.

### **3 UNBALANCE IN THE CONTRACTUAL RELATIONSHIP AND UNFAIR TERMS**

What we were able to observe in the field and in the lease agreements to which we had access, not only with regard to the elected forum, but with regard to all contractual clauses, is that, when the contractual relationship involves large landowners, the correlation of forces between lessor and lessee tends towards a greater contractual balance between the parties. That is, the landlord tends to have more say in the drafting of the agreement, either because he had access to specialized legal counsel hired by him, or because he already had some

knowledge about the drafting of lease agreements, or simply because he understands that he has some power to impose, if not all, at least some of his rules at the time of the negotiation. However, when it comes to small landowners, the contractual relationship tends to be more unbalanced between the parties, leaving the landowner in a position of weakness and submission to the will of the companies and their lawyers. Either because they don't have formal and/or practical knowledge about how leasing contracts work, or because they haven't had access to the specialized legal counsel, or even because they don't feel they can give their opinion about the contractual clauses presented to them by the companies.

The situation is even worse in cases where legal advice is offered as a contractual intermediary. In two contracts we identified contractual clauses that oblige the landowner to pay, for the duration of the contract, for legal advisory services. The Gestamp company contract stipulates that 5% of the rental income will be paid to the lawyer, as costs, for the duration of the contract. The Voltalia Energia contract, on the same manner, which refers to a wind farm implemented in the municipality of Serra do Mel (RN), goes even further and includes a clause that determines that 7.5% of the owners' monthly earnings must be subtracted in favor of an intermediary lawyer, both during the pre-study and operation phases.

### **3.1. THE SECRECY (CONFIDENTIALITY) CLAUSE**

The contracts also contain a secrecy (confidentiality) clause, which is valid for both parties, but represents an additional protection for the companies, as it results on the owners' loss. The confidentiality clause prohibits the disclosure of the contract, its transmission to third parties, or the publicizing of the financial conditions or expected payments, and the content of the contract must be kept only between

the parties. In some contracts there is the proviso: “[...] *unless they are already in the public domain* [...]”; or that the publicization of the contracts may only take place with the prior express consent of the company. It is recurrent in the contracts the existence of a contractual fine for the breach of any of its clauses, including the confidentiality clause. However, for these leases for wind power generation, the values of the fines vary between 05 million (TRALDI, 2014; 2018) and 20 million reais (BAUER, 2013).

In practice, the secrecy clause protects the company from questions about the contractual terms imposed on the owners, leading many owners not to seek specialized legal advice for fear of being punished for any breach of contract. In addition to obscuring the general contractual conditions, this clause hides the amounts paid by the wind generation companies to the lessors, which in practice prevents families, who have already signed or intend to sign leasing contracts, from discussing the terms of the contracts proposed to them with their neighbors, hindering the collective organization that could guarantee better contractual conditions for everyone.

As a result, there is a great diversity of lease agreements in which only the ways of calculating the lease amounts vary and, consequently, result in the payment of different amounts for the implementation of the same wind farm or the same wind farm assembly. Thus, both the election of a forum far from the properties and the secrecy clause seem to make access to justice very difficult, especially for small owners.

### **3.2 THE TERM OF THE WIND LEASE CONTRACTS**

Lease contracts for wind generation in the interior of the Brazilian semi-arid region have been signed with long terms, ranging from 27 to 50 years. In 19 contracts where CPFL Renováveis is sub-leasing, in the municipality of João Câmara (RN), the contracts

were signed with a term of 27 years. The same was added for 37 years, with automatic renewal for successive periods of 22 years in the absence of manifestation to the contrary by the parties. Gestamp, on the other hand, stipulates a term of 35 years for the operation phase, which can be adjusted up or down. Renova Energia, which operates in the municipality of Caetité (BA), has been signing 35-year contracts, with automatic renewal for an equal period, upon written communication to the owner. The company Voltalia Energia, in the municipality of Serra do Mel (RN), has been signing contracts of 50 years, and there may be a contract extension, as long as it is manifested by the company, in writing, 24 months before the end of the contract. In some contracts, automatic renewal clauses were stipulated, in order to limit the possibility of revising the contractual conditions.

It is common for there to be long lease terms and significant penalties for unilateral rescission in this type of contract. This is a mechanism that aims to reduce business risks for both parties. It should also be noted that in energy generation, the long contractual terms are directly related to the term of the energy generation concession, which is 35 years (ANEEL, 2009), granted by the Brazilian government. However, the long duration of the contracts and the existence of an automatic contract renewal clause, in many cases without the need for the lessors' consent, seems to indicate that, despite continuing as formal landowners, they lose control over their land for long periods, which can exceed 50 years when considering the possibility of contractual extension. Thus, the leasing contracts for wind power generation could even characterize the complete alienation of the properties, given the loss of control over the property for more than one generation.

As if the long terms of the contracts were not enough, the loss of control of the property is further aggravated when imposed also on heirs or successors. The contracts include terms of irrevocability and irreversibility and are therefore imposed even on partners, buyers,

heirs or successors. As a matter of fact, although article 15 of Decree 59.566/66 establishes that the alienation of the rural property does not interrupt the agrarian contracts, in its article 23, the same Decree establishes that if by succession *causa mortis* the rural property is shared among several heirs, any one of them may exercise the right to take back his part (DINIZ, 2006)

The provisions of item II, of article 26, of the same Decree, establish retaking as one of the forms of extinction of the lease. In other words, the contractual clause which tries to impose the contracts also to the heirs of the land is clearly illegal, and yet it was found in all the contracts analyzed by us. It is not by chance that the contract of the company Gestamp also has, among its contractual clauses, a provision that states that if any of the contractual clauses is considered invalid, either by manifest error or impracticability, the others will not be affected and their validity will be preserved. This clause aims to prevent that, in case one of the contractual clauses is considered invalid, the whole contract will be considered invalid/null.

### **3.3. TERMINATION CONDITIONS IN WIND LEASE AGREEMENTS**

The non-retractability and irrevocability of the contracts also prevents the owners from terminating the business deal before the end of the contractual term, without being disproportionately burdened. The contractual rescission is only allowed in four situations: I) expiration of the contract term; II) by mutual agreement between the parties; III) technical or economic unfeasibility of the project; or IV) if there is a breach of contract by the company.

If the rescission is not by mutual agreement, it will be litigious, and the party that causes it will have to pay for losses and damages and lost profits. Besides these, some contracts have clauses that impose a fine for breach of contract only and exclusively on landowners. As

previously stated, these fines vary between 05 million (TRALDI, 2014; 2018) and 20 million reais (BAUER, 2013). However, the contractual irrevocability and irreversibility seems to be flexible for the companies, since they could, according to the terms analyzed, terminate the contract without any burden or fine and at any time, provided they notify the landowner 30 days in advance.

In some contracts, the company's withdrawal from the deal will have to be justified with a technical report that proves the unfeasibility of the project. In other's , the following may be grounds for the company to cancel the deal without any burden: I) new conditions imposed by the authorities that compromise the development of the project; II) frustrations or harmful changes in the law that deals with renewable energy sources, the impossibility of operating the power plant, at the company's discretion; III) uncertainties or negatives regarding the granting of authorization to operate the wind farms facilities; or IV) in case of non-compliance with any of the contractual clauses by the owner.

The lease agreement subleased in favor of CPFL Renováveis guarantees CPFL Renováveis the right to terminate the contract without compensation to the owners in case of a delay of more than 60 days to obtain the licenses; or if there is an irreversible refusal by public agencies to provide construction and/or operation licenses. Another clause concerns the right to transfer the wind farm or cluster and its ownership rights to a third party, as if it were in fact their own. The wind's farm change of ownership , at least within the Brazilian semi-arid region, is very frequent. However, according to article 31 of Decree 59,566 and item VI of article 95 of the Land Statute, the lessee is prohibited from assigning the lease agreement, subletting or lending the rural property in whole or in part, without the prior express consent of the lessor. In addition, pursuant to the Decree, the landlord

may evict a tenant that subleases, assigns or lends the rural property, in whole or in part, without the prior express consent of the lessor.

There is a huge disproportionality between the parties regarding contractual obligations and burdens. The companies are guaranteed access to and full control over the properties, even before they are granted the right to generate energy, as well as protection against any and all business risks, and may withdraw at any time, in case of economic infeasibility. On the other hand, lessors may only withdraw from the business, free of charge, during the course of the contract, with the company's consent, otherwise, they would bear the costs of the termination. If the implementation of the wind farm does not occur, the company may allege that the project is technically and/or economically unfeasible and exempt itself from paying any amount to the landowners, regardless of whether the owners had stopped leasing their property to another company that could have made the project feasible, or to a company or individual that could have started a another kind of productive activity that would generate income, or even if they had stopped planting or raising animals in the area designated for the project.

#### **4 WIND LEASING AS A PATH OF DISPOSSESSION**

Although the companies argue that the lessors can continue to use the property for other activities, as long as they do not negatively affect the power plant, in field work we verified that, in many cases, the properties are surrounded by the company and no other activities take place there. Such prohibition violates the contractual clause that guarantees the use of the land for other activities, such as livestock and agriculture, because if the owners do not access the wind farm area, they cannot raise animals or plant in the area. In contracts such as *Voltalia Energia's*, the landowners must notify the company in

advance about activities that they plan to execute on the property, which the company can oppose when it understands that these may be harmful to the plant. Use restrictions also apply to the use of the subsoil, because wind farms have underground facilities that are at a minimum depth of approximately 0.8 meters from the surface. Such contractual provisions, which aim to guarantee not only access, but mainly the unrestricted control by wind power companies over properties leased for long periods, reveal the importance of land ownership for this economic activity, and how the capitalist company can exercise unrestricted control over it, without having to tie up capital to acquire the land.

It is important to note that although the companies set the lease payment per tower installed, in general they have been leasing the properties as a whole and not only the area occupied by the tower(s). Once leased, even if only a single wind turbine is to be installed there, the owner is prevented from leasing the rest of the property, as this is submitted in the property's registration, preventing any other concomitant leasing. Thus, the companies end up exercising total control over the properties for long periods without having to commit capital or pay taxes on them.

We believe that there is a strong indication that the arrival of wind power generation projects in the Brazilian semiarid region can be described as a broad process of land grabbing by the industry of this sector. The result is the dispossession of rural populations, traditional populations, peasants and family farmers, in a process of privatization and *commodification* of natural wealth, in a new wave of enclosures as was treated by Marx (2013) in the early days of capitalism, but now with new characteristics (BORRAS *et al.*, 2018; HARVEY, 2010).

This process does not always translates into the displacement and expulsion of local populations. In some cases, family farmers remain on their land, but producing for large corporations, which exercise

control over vast areas through contracts that determine what and how items will be produced. In other words, contracts are nothing more than instruments of control over land. Harvey (2010), when dealing with the appropriation of natural wealth in contemporary times, upgrades the Marxian discussion about primitive accumulation, expanding its conceptual scope and updating it under the heading of *accumulation by dispossession*, a discussion that starts from the analysis of a more general movement of capitalism in the current period, dealing with the continuation and proliferation of practices for capitalist accumulation in neoliberalism.

## 5 CONCLUSION

The conditions stipulated in rural leases for wind generation are ways to restrict the property rights of the land's legal owners and to exercise total and unrestricted control over the property, without the companies having to tie up capital to acquire it. Landowners are subjected to the economic power of the power generation companies, in this sense, the contracts are an instrument of dispossession of the local population's land and rights .

Obtaining wind lease contracts under better conditions for landowners, depends on the individual's ability to negotiate, legal knowledge or access to legal advice for their best interests, as well as their subsistence conditions, which precedes the contracts. Landowners with better financial conditions have greater bargaining power, because they are not afraid of losing the opportunity to sign the contract and will not be economically dependent on them. Owners who live in poverty and great economic difficulty find it harder to express their wishes, because their socioeconomic situation does not allow them to risk losing the opportunity to ensure a stable income, even if it

is very low when compared to the gains earned by wind generation companies.

We also believe that inequality in land distribution, the pre-existing land concentration in the vast majority of the Brazilian territory, combined with the arrival of wind generation companies and the signing of the respective wind lease contracts end up becoming factors that produce more inequality. This occurs because, when signing contracts, given the size of the properties and the technical standards that define the minimum distance between turbines, small landowners are less likely to have a large number of turbines installed on their land, which directly interferes with the income they will obtain from the leasing. They also become more susceptible to the use limitations imposed by the contracts, since they mostly refer to the minimum distance of the area to be reserved, where land use around wind power equipment is not allowed to landowners, reducing the area available for production, when they can.

The large landowners who sign wind lease contracts, on the other hand, are not only proportionally more likely to have a large number of turbines installed on their property, and thus receive higher lease payments, but are also less susceptible to the interests and power exerted by the companies, or by regional and local political and economic forces - when they are not part of such forces - as well as to the action of middle-men, and have access to the legal knowledge necessary to bargain for better contractual conditions. Furthermore, the amounts paid by the companies to landowners for leasing their properties are derisory in relation to their earnings.

When foreign, the profits, or at least part of them, are remitted abroad. Since most of the companies that operate within the Brazilian semiarid region are foreign - out of a total of 25 companies, 16 are foreign - we can affirm that an important part of the wealth produced in the generation of electricity from wind power in this region is

garnered by other countries. McCarthy (2015) seems to be correct when he states that the socio-ecological adjustment proposed to solve the current trends of capital crisis, whether energy or environmental, from the expansion or even complete replacement of fossil fuels by renewable energy sources, would involve new and powerful rounds of investments and claims over vast rural areas, especially where land values are lower and formal property rights are more fragile, which could result in new waves of expulsion of economically and politically marginalized populations, particularly in the global south.

Wind lease contracts are, in this context, instruments of unrestricted control over property and are designed for that end. In this sense, the long terms of the contracts; the choice of a distant forum that makes it difficult for lessors to access justice to question the contractual terms; the limitations and use restrictions imposed on landowners; the imposition of contractual clauses that fix unilateral fines of millions of dollars on landowners in case they give up the business; the extension of the obligation to enforce contracts to the heirs of lessees in the event of the death of the lessor-owner; and the imposition of confidentiality clauses that make it difficult for landowners to organize themselves to collectively negotiate for better contractual conditions are, at the same time, mechanisms of control over property and of expropriation of landowners from their land as a means of production.

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可再生能源市场产权配置方式

**O CAMINHO DO DIREITO DE PROPRIEDADE DO MERCADO NA  
ALOCÇÃO DE ENERGIA RENOVÁVEL**

**THE WAY OF MARKET PROPERTY RIGHT ALLOCATION OF  
RENEWABLE ENERGY**

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## 摘要

可再生能源正面临市场化改革和产权配置的法律挑战。近年来，可再生能源改革主要侧重于政府调整，而忽视了以市场为导向的产权改革。以产权配置市场化改革为主线，可再生能源改革存在产权基础缺失、产权重叠困境、产权交易困难、产权平等保护等制度障碍，这极大地影响了可再生能源的管理和使用效率。因此，在产权重叠和分离的过程中，应明确可再生能源的所有权。按照可再生能源市场化的发展方向，打破市场准入和壁垒，建立产权平等保护制度和可再生能源产权保障获取机制。

**关键词：** 可再生能源； 市场； 改革； 可再生能源产权

## RESUMO

A energia renovável está enfrentando os desafios legais da reforma orientada para o mercado e da alocação de direitos de propriedade. Por algum tempo, a reforma da energia renovável se concentrou no ajuste do governo e negligenciou a reforma do direito de propriedade voltada para o mercado. Tomando a reforma orientada para o mercado da alocação de direitos de propriedade como linha principal, existem obstáculos institucionais, como a ausência de base de direito de propriedade, o dilema de direitos de propriedade sobrepostos, dificuldades na transação de direitos de propriedade, a proteção igual dos direitos de propriedade e assim por diante na reforma de energia renovável, o que afetou muito a gestão e a eficiência do uso de energia renovável. Portanto, a propriedade da energia renovável deve ser esclarecida no processo de sobreposição e separação de direitos de propriedade. Tomando a direção do desenvolvimento da energia renovável orientada para o mercado, quebrando o acesso ao mercado e

as barreiras e estabelecendo um sistema de proteção igual dos direitos de propriedade e um mecanismo de aquisição garantida de direitos de propriedade de energia renovável.

**Palavras-chave:** Energia renovável; Reforma orientada pelo mercado; Direitos de propriedade da energia renovável.

## ABSTRACT

Renewable energy is facing the legal challenges of market-oriented reform and property right allocation. For quite some time, renewable energy reform focuses on government adjustment and neglects the market-oriented property right reform. Taking the market-oriented reform of property rights allocation as the principal line, there are institutional obstacles such as the absence of property right basis, the dilemma of overlapping property rights, difficulties in property rights transaction, the equal protection of property rights and so on in renewable energy reform, which has greatly affected the management and the use efficiency of renewable energy. Therefore, the ownership of renewable energy should be clarified in the process of overlapping and separation of property rights. Taking the development direction of the market-oriented renewable energy, breaking down the market access and barriers and establishing a system of equal protection of property rights and a mechanism of guaranteed acquisition of renewable energy property rights.

**Key words:** Renewable energy; Market-oriented reform; Property rights of renewable energy.

## 1 INTRODUCTION

Since the beginning of new century, as an effective tool to control excessive energy consumption and climate change issues, renewable energy has gradually become a substitute for fossil energy. In the global perspective, The Intergovernmental Panel on climate change believes that: "Renewable energy provides opportunities for the development of social and economic aspects, such as: the access to energy, the security of energy supply, the mitigation of climate change, and reducing adverse impacts on the environment and health. Providing access to modern energy services will support the achievement of the millennium development goals." In the field of China's reform, renewable energy is powerful grip to effectively realize ecological civilization and promote the realization of the "double carbon" goal. However, at present, renewable energy in China is facing the difficult problem of institutional failure in market mechanism and property rights allocation. The development of renewable energy has chronically relied on administrative means to promote and adjust it, ignoring the important functions of market mechanism and property rights system in resource allocation, which has affected the reform and development process of renewable energy.

## **2 THE PROBLEM OF PROPERTY RIGHT ALLOCATION OF RENEWABLE ENERGY MARKETIZATION**

### **2.1 LACK OF PROPERTY RIGHT BASIS: WHETHER NATIONAL OWNERSHIP CAN BE ESTABLISHED ON RENEWABLE ENERGY OR NOT**

For a long time, discussion on the theory of property rights, especially the elastic extension of property rights, has always been a hot topic in legal research. Renewable energy has a strong property attribute, important use and exchange value, which is an important material means of production to support industrial development and residents' life. Therefore, can renewable energy establish property rights in property law? What specifically established is the proprietary rights of things, or the usufruct of things? Does the right belong to the state or private investors? These constitute the right basis proposition of renewable energy reform.

According to Article 9, paragraph 1 of the 2018 Constitution of the people's Republic of China: "All mineral resources, waters, forests, mountains, grasslands, unreclaimed land, beaches and other natural resources are owned by the state, that is, by the whole people, with the exception of the forests, mountains, grasslands, unreclaimed land and beaches that are owned by collectives in accordance with the law." As the "basic law" in the field of property, Civil Code of the People's Republic of China adopts the same legislative attitude. Article 250 of Civil Code of the People's Republic of China stipulates that: "Natural resources such as forests, mountains, grassland, waste land, and intertidal zones belong to the state, except that they are owned collectively as provided for by laws." Observing from the theoretical level of legal interpretation, on the one hand, Article 9 of the Constitution and article 250 of the civil code adopt the "enumeration" legislative technology,

making it clear that the seven natural resources of “mineral deposits, water flows and forests” belong to the state. On the other hand, Article 9 of the Constitution and article 250 of the civil code share the same technical space for expanding interpretation. The word “beach, etc.” in Article 9 of the Constitution and article 250 of the civil code, which provides for “shoals, etc.”, means that legislators adopt an “open” legislative attitude, that is, to maintain the extensibility and openness of the legal concept of natural resources with “etc”. Here, the property right basis of renewable energy asks whether renewable energy can be included at the legislative level within the interpretative range of the word “etc.” in Article 9 of the Constitution and article 250 of the civil code at the legislative level. If it can be included, renewable energy belongs to the category of natural resources defined by law, and national ownership can be established on it. If it cannot be included, the proposition of the right basis of renewable energy still needs to find other legislative outlets.

## **2.2 THE DILEMMA OF OVERLAPPING PROPERTY RIGHTS: ENERGY RIGHTS ATTACHED TO RESOURCE UTILIZATION BEHAVIOUR**

Renewable energy usually depends on the development and utilization behaviour of other natural resources. Different from the direct development and utilization activities of mineral resources and land resources, the development of renewable energy is always based on the utilization of other resources species, and in the process of utilization of other resources, a state of overlapping property rights similar to “resources of resources” is formed.

First, in the field of photovoltaic power generation, the use of solar energy cannot simply apply the traditional “capture rules” of resources (or energy) to define the ownership of property rights. The reason is that the acquisition of solar energy is not “directly available”.

We can not imagine that a large amount of solar energy can be collected without resorting to any use of space resources. In fact, the real scenario of photovoltaic power generation always depends on the exclusive occupation and utilization activities of the resources of specific plots. Here, photovoltaic power generation activities are intertwined with at least three difficult problems of property rights superimposition: First, the land property rights on which the photovoltaic facilities depend; Second, as a resource, whether solar energy has national ownership; Third, the property rights of solar energy and electric energy converted through photovoltaic projects.

Second, in the wind energy field, wind power, as an atmospheric phenomenon, has strong fluidity, variability and instability, which makes it difficult for wind power resources to simply apply the principle of property right object specificity in the property right theory, so as to form a stable right object, right subject and right content. Similarly, the acquisition of wind power and energy conversion are often based on the use of specific plots. More importantly, the “land use” here is not only limited to the land area occupied by the wind power generation facilities, but also subject to the wind attenuation effect, which requires that no other wind power generation facilities or other buildings blocking the wind can appear within a certain distance range. Here, wind power generation activities are intertwined with at least four property rights superimposing difficult problems: First, the land property rights on which wind power facilities depend; Second, the negative restrictive property rights requirements formed on the adjacent land to ensure the normal operation of wind power facilities; Third, as a resource, whether there is a problem of national ownership of wind energy; The fourth is the property rights of kinetic energy or electric energy converted by wind power generation projects.

Third, in the field of water energy, the use of water energy depends not only on the specific land occupied by water conservancy

facilities, but also on the mobility of water resources and the potential energy formed. Here, water conservancy and power generation activities are intertwined with at least three property rights superimposing difficult problems: First, the land property rights on which the water conservancy facilities depend; Second, as a legal natural resource type, water belongs to the state; The third is the property rights of kinetic energy or electric energy converted through hydropower power generation projects.

Article 9, paragraph 2, of the Constitution of the People's Republic of China provides that: "The state ensures the rational use of natural resources and protects rare animals and plants. Appropriation or damaging of natural resources by any organization or individual by whatever means is prohibited." Thus, the distinction between resource ownership and resource utilization right is formed, and the property right distinction of renewable energy based on resource utilization behavior is further formed. From the above-mentioned typical fields of renewable energy, it reflects the strong dependence of renewable energy development and utilization activities on other resources ontology, and thus derives the overlapping problem between multiple property rights subjects and various property rights forms.

### **2.3 THE DIFFICULT PROBLEM OF PROPERTY RIGHTS TRANSACTION: DEFINING THE VALUE OF PROPERTY RIGHTS BY ADMINISTRATIVE MEANS**

Limited by the public nature of renewable energy itself and the imperfect development of the market mechanism, the current trading mechanism of renewable energy mainly depends on administrative means. Including the comprehensive system design of renewable energy transaction pricing, compulsory sales, safeguard measures, policy subsidies, etc., which has formed the legislative characteristics defining

the boundary of renewable energy property rights by administrative means in China.

First, the policy advantage and legislative keynote established by the renewable energy law. Article 4 of the renewable energy law stipulates that “The state shall give priority to the development and utilization of renewable energy in energy development and promote the establishment and development of the renewable energy market by setting an overall target for the development and utilization of renewable energy and adopting corresponding measures.” This article has laid the legislative keynote of safeguard and policy superiority in the development of renewable energy.

Second, the guaranteed purchase system established by the renewable energy law. Article 14 of the renewable energy law stipulates that: “The state applies the system of guaranteeing the purchasing of electricity generated by using renewable energy resources in full amount. The energy department of the State Council shall, together with the State Electricity Regulatory Commission and the public finance department of the State Council, and according to the national plan for the development and utilization of renewable energy resources, determine the target proportion, which shall be realized in the planning period, between the electricity generated by using regenerable energy resources and the total electricity generated and work out the specific measures for power grid enterprises to firstly schedule the generation of electricity with renewable energy resources and purchase electricity generated by using renewable energy resources in full amount. The energy department of the State Council and the State Electricity Regulatory Commission shall urge the implementation of such measures in the planning years. Power grid enterprises shall conclude grid connection agreements with enterprises which generate electricity by using renewable energy resources and which have gone through the administrative licensing or archive-filing formalities according

to the plan for the development and utilization of renewable energy resources, purchasing in full amount the on-grid electricity of the grid-connected power generation projects which meet the grid connection technical standards in the coverage area of their power grids. Electricity generating enterprises are obliged to cooperate with power grid enterprises in protecting grid security. Power grid enterprises shall strengthen the power grid construction, expand the scope of areas where electricity generated by using renewable energy resources is provided, develop and apply intelligent power grid and energy storage technologies, improve the operation and management of power grids, improve the ability for absorbing electricity generated by using renewable energy resources, and provide services for bringing electricity generated by using renewable energy resources on grid. “

Third, the compulsory sales and trading system established by the renewable energy law. In order to promote the application of renewable energy as much as possible, Article 16 of the renewable energy law stipulates that “The state shall encourage the clean and highly efficient development and utilization of biomass fuels and the development of energy crops. Enterprises operating a gas or heat pipe network shall accept the access to its network of the gas or heat produced by using biomass resources, provided that the gas or heat meets the technical standards for access to the urban gas or heat pipe network. The state shall encourage the production and utilization of biological liquid fuels. Each petrol selling enterprise shall, in accordance with the relevant provisions of the administrative department of energy of the State Council or of the local people’s government at the provincial level, incorporate biological liquid fuels that meet the national standards into its fuel selling system.” This article breaks through the market economy principle of free trade to a certain extent, and clearly stipulates the legal treatment and accommodation obligations of relevant energy sellers and users for renewable energy in the form of legislative public

power. It can be seen that the compulsory purchase obligation in Article 16 of the renewable energy law stipulates the compulsory provisions on the integration of renewable energy power generation and the network access of biomass resource products, which also constitutes the “compulsory purchase system” stipulated in the renewable energy law. In fact, in the regulatory documents of renewable energy (such as fagainengyuan [2016] No. 625), the distinction between “guaranteed acquisition” and “market transaction” has long been made; On the other hand, it is clear that the state provides favorable and convenient procedural guarantees and final rescue guarantees suitable for the development of renewable energy.

Fourth, the administrative pricing limit system established by the renewable energy law. Article 19 of the renewable energy law stipulates that: “The on-grid electricity prices for projects of electricity generation by using renewable energy shall be determined by the administrative department of price of the State Council in light of the conditions of different areas and the characteristics of electricity generation by using renewable energies of different types, and according to the principle of helping promote the development and utilization of regenerable energies and the principles of economy and rationality, and be adjusted in a timely manner by the same department in light of the development of the renewable energy resource utilization technology. On-grid electricity prices shall be published. The on-grid electricity price for a project of electricity generation by using renewable energy for which public bidding is held under Paragraph 3 of Article 13 hereof shall be the price as fixed through bidding, provided that the price may not be higher than the that as set under the preceding paragraph for a project of the same type.”

Fifth, the financial support fund system established by the renewable energy law. Article 24 of the renewable energy law stipulates that “A renewable energy development fund shall be set up by the

national finance, and the sources of funds shall include the annual special-purpose funds arranged by the national finance, the additional income to the price of electricity generated by using renewable energy resources as collected according to law, etc. The renewable energy development fund shall be used to compensate for the differences mentioned in Articles 20 and 22 and to support: (1) the scientific and technological research in, the formulation of the standards for and the demonstration projects for the development and utilization of renewable energy resources; (2) the renewable energy utilization projects in rural and pastoral areas; (3) the construction of the independent electricity generation systems using renewable energy resources in remote areas and islands; (4) the prospecting and assessment of renewable energy resources and the construction of relevant information systems; (5) the promotion of the localized production of equipment for the development and utilization of renewable energy resources. For the access cost and other relevant costs mentioned in Article 21 of this Law that cannot be recovered from the selling price of electricity, the power grid enterprises may apply to the renewable energy development fund for subsidies. The specific measures for the administration of the collection and use of the renewable energy development fund shall be formulated by the public finance department of the State Council together with the energy department and the price department of the State Council.”

## **2.4 EQUAL PROTECTION OF PROPERTY RIGHTS: MARKET ACCESS AND BARRIERS IN DEVELOPMENT ACTIVITIES**

In the field of renewable energy development, there are unfair issues of property rights protection. At present, the monopoly of state-owned capital is a current obstacle to the access of private capital in the renewable energy field. Although the increasingly clear laws and policies provide important opportunities for private capital to enter the renewable energy industry, the monopoly of state-owned capital has become the main obstacle for private capital to enter the renewable energy industry. Since most renewable energy is ultimately converted into electric energy, and the electric power industry belongs to the “industry that is controlled by the state-owned economy and has a bearing on the lifeline of the national economy and national security” as defined in China’s anti monopoly law, although the state not only protects the “legitimate business activities” of the industry, but also “implements supervision and regulation according to law” on the “business activities of the operators”, However, the declarative nature of legal norms makes large-scale state-owned enterprises and relevant government agencies have little scruples about their self-imposed monopolistic practices in the renewable energy power field, and also leaves law enforcers at a loss.

The first is the entry restriction of power generation. In China’s competitive renewable energy field, large state-owned enterprises usually bid for wind power, photovoltaic and other renewable energy power generation projects at unreasonable or lower prices than the cost, forcing private enterprises to withdraw from the competition. Due to the state-owned enterprises having large scale businesses, the state-owned enterprises can make up for the loss of lowering the bidding price in the renewable energy field with the income from

other fields; Most private enterprises do not have the above advantages of state-owned enterprises due to their small scale and single business.

The second is the purchase restriction of transmission services. In the same region, it is in line with the principle of efficient allocation of social resources for one enterprise to monopolize the renewable energy transmission business with natural monopoly property. However, the transmission enterprises with legal monopoly rights must operate according to law and shall not abuse their legal market dominance that it has acquired. However, China's state-owned power transmission enterprises often obstruct private enterprises' access to the grid by refusing access to the grid, restricting the amount of electricity on the grid, lowering the on-grid price, and discriminating against access to the grid. Although the power transmission enterprises consider that they do not meet the technical requirements for grid access and affect the safety of the power grid as the reason for restricting the access of renewable energy power to the grid, and formally comply with the provisions of Article 14 of the renewable energy law of China, it is generally believed that there are almost no technical problems in the access of wind power and photovoltaic power to the grid. The essence of the problem is that the renewable energy power grid will make the power transmission enterprises lose their monopoly interests: the wind power grid will not bring obvious benefits to the power transmission enterprises but increase their work difficulties. In essence, the combination of natural monopoly business (power transmission) and competitive business (power distribution and power generation) makes China's power transmission enterprises not purely public welfare organizations, but organizations with the identities of "athletes" and "referees". The interest temptation of competitive business (power distribution and power generation) leads them to refuse or unfairly provide grid connection services for private renewable energy power enterprises.

### **3 THE PERFECT PATH OF PROPERTY RIGHT ALLOCATION OF RENEWABLE ENERGY MARKETIZATION**

First, clarify the property right basis of renewable energy. The discussion on the property law of renewable energy cannot avoid the issue of the property rights basis of renewable energy itself. Under the framework of the current law, by defining renewable energy as “natural resources”, and then affirming the “owner status” of the state for renewable energy and bringing it into the category of concept of “national ownership”, we are faced with a certain degree of interpretation dilemma. The development and utilization of renewable energy depends on the business behavior of the project operator, which is a certain distance from the concept of natural resources in the state of “natural existence”. The excessive expansion and interpretation of the concept of law easily tends to distort the will of the legislators, which goes against the spirit of modern rule of law. Therefore, it is necessary to clarify the property rights basis of renewable energy, to promote the improvement of market-oriented property rights allocation of renewable energy.

Second, in the process of overlapping and separating property rights, the ownership of renewable energy should be clarified. Renewable energy development activities depend on the use of other natural resources. Therefore, it is necessary to clarify the property ownership of the resource body on which renewable energy depends and distinguish it from the property ownership of renewable energy. The renewable energy developers may use land to install related devices for power generation, or lease residents’ roof to operate solar power generation equipment. Then, the ownership of the device or equipment, the distribution of profits arising from power generation and sale, and the right to lease must be appropriately determined and

clarified. In short, the ownership of renewable energy needs to be identified in the complex property rights network of “overlapping property rights”. However, the clarification of rights and interests of renewable energy developers is a tough task because there are conflicts among different interest claimants. Take the development of wind energy as an example. As a renewable energy, the property rights of wind energy should belong to the operating entity of wind energy projects. The owners of the land used for wind energy projects and the surrounding land have no right to claim the rights and interests of income distribution of wind energy projects. The realization of the value of their land rights should be solved through other means. Specifically, the owner of the land parcel for the wind energy project can conclude a land transfer and lease contract with the wind energy project development subject based on the use rights and interests of the land parcel to realize his own rights and interests. For the land owners who have undertaken to prohibit the construction of excessively high buildings and structures around the wind energy project to reduce the wind energy, they can claim corresponding economic compensation from the wind energy project operators because their own land bears the restrictive property burden. Another case is the development of water energy where many individuals or organisations such as local village committees may claim interests in the river running across their villages or lands. In such situation, water energy developers have to negotiate with various interest claimants concerning how to clarify and divide the ownership and right of use of the water. Mere economic compensation may not solve the dispute arising from the use of water energy because there are interest conflicts among different participants. Hence, such questions as to what extent and who has ownership or right of use of renewable energy should be clarified for the purpose of fast development of renewable energy industry.

Third, the development direction of renewable energy marketization should be clarified. The development of renewable energy can be achieved only when it becomes a profitable business. When renewable energy developers can't obtain profits from the use of renewable energy within a reasonable period of time or cover their investment and cost in developing renewable energy, the industry doesn't have a fast and steady growth. To promote the industrial development, a matching property rights trading system should be constructed. High technology, high investment and high politics make so, renewable energy must have definite technology property rights, investment property rights and resource property rights. The core of property rights is to ensure that efforts are proportional to rewards, which is becoming an incentive source of renewable energy characterized by destructive innovation. The realization of the main interests of property rights is undoubtedly the core of renewable energy incentive. Theoretically speaking, the renewable energy property right has the potential to pursue the maximization of interests, the technology to expand the human and natural margins, and the investment rationality and system guidance. Therefore, the property right incentive is boundless, and the technology property right, the investment property right and the resource property right promote each other. As North said: "the increase in the rate of technological progress is due to the expansion of the market scale and the possibility that inventors can obtain a larger share of their invention income." However, property rights are subject to social and political influences. "Efficient" property rights are not common in history. We must make the energy industry form a competitive market rather than a financial market. With the take-off of the renewable energy market, the government should gradually focus its support on the institutional construction of promoting the improvement of total factor productivity, comprehensively promote the construction of the aforementioned three types of property rights,

ensure the efficiency of property rights and transactions, and expand the freedom of the renewable energy market. The government should learn the conversion between financial incentives and property rights incentives while strictly enforcing the applicable scope and conditions of financial incentives. Only in this way can the energy property rights be cultivated and finally grow. From financial incentive to property right incentive is a mature sign of energy development and transformation. Correspondingly, the government should formulate relevant laws to regulate renewable energy market, define property rights in renewable energy and protect legitimate interests and rights in renewable energy.

Fourth, it is essential to establish a purchase-guarantee mechanism for subjects of renewable energy property rights. The terminal purchase of renewable energy is the final guaranteed link. The public authority needs to provide necessary final balance guarantee purchase. It belongs to the assistance mechanism and can be configured with balance ratio and applicable limitations. In terms of legal text, the “full guaranteed purchase” in Article 14 can be adjusted to “final guaranteed purchase” in the improvement of the renewable energy law. On the one hand, the expression of full amount is out of date. In fact, the distinction between “guaranteed purchase” and “market transaction” has long been made in the regulatory documents of renewable energy (such as *fagainengyuan* [2016] No. 625); On the other hand, what the state provides is favorable and convenient procedural guarantee and final assistance guarantee suitable for the development of renewable energy. Under current circumstances of renewable energy development, guaranteed purchase is the core while market transaction is supplementary. The government merely determines the upper limit of guaranteed purchase for renewable energy generation enterprises but does not intend to cancel or prohibit normal market competition in the renewable energy power generation industry.

Fifth, break down market access and barriers, and build an equal protection system for property rights. With regard to the application of the free competition rules for the expansion of the market competition space in the system connection of the promotion of the development of renewable energy, Shi Chao proposed that in terms of the factor marketization mechanism, in view of the lack of market competitiveness of renewable energy itself and the most need for competition to promote innovation and improve efficiency, property rights should become the key to cultivate the competitive market of renewable energy. On the one hand, renewable energy depends on technology and innovation, and the essence of innovation is a process of a hundred schools of thought contending and constantly trying and making mistakes, and the market needs the participation of multiple subjects; On the other hand, the long return period or large initial investment is another large uncertainty risk of the renewable energy industry itself. A clear property rights system can enhance investors confidence. In terms of specific measures, on the one hand, we will promote the diversification and equal protection of property rights in the field of renewable energy, reverse the situation of “monopoly of state-owned capital and restriction of private capital and technology”, and create an institutional environment of pluralistic participation, equal opportunities, and equal protection between public and private, To create basic competitive conditions for the improvement of “renewable energy efficiency”; on the other hand, to promote the market flow of property rights, the renewable energy law should establish a unique guarantee system for the access, circulation and exit mechanism of renewable energy enterprises, in particular, specify the special protection for private property investment, and strengthen the incentive policies of financial and tax support for new entrants and small and medium-sized enterprises. Secondly, at the regulatory level of restricting competition, efforts should be made to separate the monopoly link of the basic

market that bears certain infrastructure functions from the competitive link, compress the monopoly link, and expand the competition space. Taking the power industry as an example, the power transmission, distribution and generation, and sales of electricity can be subdivided into monopoly market and competitive market, respectively. The revision of the power law aims to marketize the latter and standardize the former. There should be room for the system convergence of the renewable energy law, which should be updated in time in the revision of the renewable energy law. In fact, to ensure fair competition in the energy market, Germany has formulated regulations on the separation of relevant businesses of power grid operators. Articles 6a to 10e of the German energy economy law promote market competition by defining energy supply enterprises to ensure that they still have compatible competition modes under normal operation. After the differentiation, the basic market with natural monopoly attribute to a certain extent can be intervened through administrative regulation mode to regulate its incompatible competition behavior, while the monopoly competition market can be directly adjusted by the anti-monopoly law.

巴西乡村可再生能源园区的所有权、产权处置和中国替代方案

**POSSE, DIREITO DE PROPRIEDADE E DESPOSSessão DO  
CAMPESINATO BRASILEIRO NOS PARQUES DE ENERGIA  
RENOVÁVEL E A ALTERNATIVA CHINESA<sup>17</sup>**

**POSSESSION, PROPERTY RIGHTS AND DISPOSITION OF  
BRAZILIAN PEASANTS IN RENEWABLE ENERGY FARMS AND  
THE CHINESE ALTERNATIVE**

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## 摘要

本文探讨了风能清洁高效、促进立法改革和共同投资理念与显示的差距，即劳动力的剩余价值和不平等的再生产之间的差距。这种不平等有助于理解可再生能源租赁合同中相对于土地和土地租金价值的生产关系。土地的使用价值与资本相关，但其本质是基于私人财产自由处分的交换价值。本文提出从三个方面分析可再生能源扩张对于土地结构、美元霸权和剩余价值分配的影响，如土地租金对能源分配和私有财产收益的影响，土地占用方式对农业生产的影响，扩张资本与传统资本之间的博弈，以及其合同条款和土地产权在可再生能源扩张中的法律影响。本文还提到了中国在可再生能源方面的经验及其能源政策，表明中国可以在巴西开发可再生能源，特别是为巴西农民提供比欧洲和美国更公平、更合理的替代方案。简言之，可再生能源的扩张势必影响农民传统的土地收益方式。此外，它还强调了中美在可再生能源领域的争端，以及这一争端如何影响剩余价值的分配，并可能对全球南方的农民产生相关影响。

**关键词：** 中国方案；可再生能源；财产权；农民

## RESUMO

O texto aborda as deficiências existentes entre a visão comum de que a energia eólica é limpa e eficiente, impulsionando mudanças legislativas e investimentos, e a natureza da sociedade atual baseada na herança de mais-valor da força de trabalho e na reprodução desigual. Essa desigualdade ajuda a compreender as relações de produção em relação à terra e ao valor da renda da terra nos contratos de arrendamento de energia renovável. A terra possui um valor de uso relacionado ao capitalismo, mas é valorizada com base em um

valor de troca arbitrariamente fixado pela propriedade privada. Isso envolve utilidades naturais gratuitas (fertilidade do solo, força dos ventos), frutos materiais e civis extraídos da exploração da força de trabalho na terra e uso do espaço. Propõe-se investigar três aspectos: o impacto da expansão das energias renováveis na estrutura fundiária, o dólar padrão e a distribuição de excedentes de capital, como a renda da terra influencia a apropriação da energia e o papel do direito de propriedade privada. O método utilizado envolve a perspectiva do desapossamento e a relação entre capital fictício e produtivo, além do impacto jurídico das cláusulas contratuais e dos direitos de propriedade da terra na expansão das energias renováveis. O texto também menciona a experiência chinesa com energias renováveis e sua política energética, sugerindo que a China pode oferecer uma alternativa mais justa e menos desigual em relação à Europa e aos EUA no desenvolvimento das energias renováveis no Brasil, especialmente para o campesinato. Em suma, o artigo argumenta que a expansão das energias renováveis está relacionada a um processo de mudança de paradigma que envolve o desapossamento das comunidades campestres. Além disso, destaca a disputa entre China e EUA no campo das energias renováveis e como essa disputa pode impactar a distribuição dos excedentes de capital, com possíveis consequências desfavoráveis para o campesinato no sul global.

**Palavras-chaves:** China; Energia renovável; Direito de propriedade; Campesinato.

## ABSTRACT

This paper approaches gaps between the common belief that wind energy is clean and efficient, promoting legislative changes and

investments, and the nature of our current society is based on the workforce's surplus value and unequal reproduction. This inequality helps to understand the production relations relative to land and land of rent value in renewable energies rent contracts. The land has a use value related to capitalism, but its value is based on an exchange value arbitrarily fixed by the private property. This involves free natural utilities (land fertility, wind power), natural and civil fruits extracted from the workforce in land and its use. The paper proposes to investigate three aspects: the impact of renewable energies expansion in the land structure, the dollar hegemony and the distribution of surplus value, like land of rent influences energy appropriation and the role of private property law. The method chosen involves the perspective of dispossession and the relation between fictional and productive capital, as well as the juridical impacts of its contracts clauses and the rights of land property in the renewable energies expansion. This paper also mentions the chinese experience in renewable energies and its energetic policies, suggesting China can offer a fairer and less unequal alternative than Europe and United States in developing renewable energies in Brazil, especially for the peasantry. In short, this article argues that the expansion of renewable energies is related to a paradigm changing process involving the dispossession of peasant communities. Furthermore, it highlights the dispute between China and USA in the renewable energies field and how this dispute could impact the distribution of surplus value, with possible unfavorable consequences for the peasantry in global south.

**Keywords:** China; Renewable energies; Right of property; Peasantry.

## 1 INTRODUCTION

Common sense, presented in international forums, is that wind energy is a clean and efficient energy in a technological society, at least this is what is told in Brazil, accompanied by legislative changes and significant investments, comes across the nature of our current society, seated in a way of production based on continuous extraction of surplus value in the workforce that, in its turn, generates capital surplus, being one of the tasks the continuous reabsorption of this surplus in production for social reproduction, which excludes workforce and creates unequal relations.

This contradiction helps to understand the production relations, which have the land as object, and what there is concretely in land of rent on possession and property relations in renewable energies rent contracts. The land has a use value that must be considered in relation to capitalism, but it is valued by a trade value, arbitrarily fixed by the simple condition of private property. It involves. a) free utilities given by nature (land fertility, ground for wind power capture and etc); b) natural and civil fruits extracted of the exploration of workforce in the use of land; and c) land use (MARX, 2017). This problem forwards three objectives to be investigated: 1) if there is relation between the expansion of renewable energies, the dollar hegemony and the distribution of capital surplus; 2) to which extent land of rent helps to understand the role of private property law in the energy appropriation process and 3) the result of all this in land structure.

The method approaches dispossession perspective and the relation between fictional with productive capital and the juridical impact in the contract clauses and in the juridical rearrangement of land ownership in the expansion of renewable energies. It searches for a support in the Chinese experience with renewable energies and its energy policies, to verify if, within the scope of chinese-brazilian relations, China

could offer a fairer and less unequal alternative, compared to Europe and USA, in social relations of renewable energies development in Brazil, including for its peasantry.

This article aims to argue is, in first place, it hides a paradigm changing process, very visible in international news vehicles, much similar to what happened in 1945 and in 1989-1991, and it requires dispossessing peasant communities. In second place, there is a dispute in the renewable energies field between China and USA, which cannot be ignored, because the global values of energy could be, in a given moment, unified in the wind and solar potential. In the basis of renewable energies expansion in occidental countries, a hypothesis is affirmed, the reconfiguration of capital surplus is happening at the cost of the global south peasantry. All the international governance (IMF, WTO, World Bank, NATO) is turned to the management of the absorption of this surplus. But, in the basis of Beijing, there is a possibility of a fairer and less unequal energetic development for the global south.

## **2 RENEWABLE ENERGIES, DOLLAR HEGEMONY AND THE DISTRIBUTION OF CAPITAL SURPLUS**

In the basis of renewable energies expansion, there is a reconfiguring necessity for the distribution of capital surplus. All the current world governance structure, mobilized by western national states, is turned to that.

This situation happens because of the necessity to ensure the dollar hegemony as the universal equivalent in global trade system. It is fundamental to ensure financial backing in this equivalent.

The monetary ambient is not as autonomous in relation to production as it seems. The money, as a universal equivalent, must be backed in a fundamental energetic resource. Currently, this energetic

resource is still oil, gas and their derivate. However, the capitalist production development and continuous absorption of surplus represent a threat that the ending of those fossil resources compromise the power projection capacity of USA in the globe (MAIA; FARIAS, 2022). It generates contradictions, and the way of administering those contradiction in western countries, is to throw them at a superior level in the financial system hierarchy that allows more surplus value extraction in global south countries. In this regard, Yang Shuai and Wen Tiejun (2022) seem to acknowledge the threat it represents for China, in terms of financial instability, in arguing the necessity of a new currency issuance system to avoid global financial clashes.

Our society deals with resources production exploring workforce, with the objective of transforming resources in products to be taken to the market, as commodity, and then be exchanged for a plus money (an over profit), a plus in surplus value. This is the propulsion of our society, it buys a resource to be benefited, and this benefit is due to the extraction of an extra use value of workers and it is transformed in a refined product or a diversity of products. The next step is to launch this product to circulate in the market as commodity to generate an over profit (a plus money) to be appropriated by the capitalist. This propulsion system is a producer of surplus, and the western society behaves this way.

The questions ends in renewable energies. It is noticeable that nowadays there is a tentative of changing the dollar financial backing to renewable energetic resources, apparently, of low environmental impact. However, the logic of capitalist production is maintained and evidences itself in the environmental agreements in the last 40 years, which do not approach the contradictions of current society's essence, including distributive questions. The agreements are limited only to distribute the environmental onus. But the distribution of environmental onus will be obviously unequal because the international relations are unequal.

When discussing environmental onus, what is discussed? Where this protection will be? On the expenditure of countries located in the center of capitalism or in the production of countries in the periphery of capitalism? If it is placed in the expenditure of central countries, and carbon credits are a stimulus for that, it will compromise the global south countries strategy of development.

The problem is that the fundamental question is not touched upon: the workforce surplus value extraction process, ever able to generate surplus to be accumulated by a fraction of society, which only relation with production is to be the entrepreneur, to manage the thing, the capitalist's work, in which are founded all the strategies to social (re)appropriate nature.

In our opinion, this is the center of our environmental crisis. It is a structural problem. The world is living a global capitalism reconfiguring, which passes through, necessarily, in keeping the dollar as an universal equivalent. The dollar as an universal equivalent maintenance in global commodity trades is fundamental so that the USA can intervene in economical policies in underdeveloped countries. It is unnecessary to bring data to prove that, it is enough to read news articles and verify the application of sanctions and taxation in plenty of countries, people and companies by manipulating the international payment system, SWIFIT.

Big international corporations are encouraged, with national States support, to go by the dollar hegemony as an universal equivalent, to reach for financial backing in dollar in renewable energies. The impacts of technological revolutions in the capitalist productive forces will create new conditions to capital reproduction, for example lithium batteries, used for electric energy storage, which allows massive exportation of the energy produced by the wind and solar energy farms. In Brazil, this also was accompanied by the privatization of Eletrobras.

To understand such a question, it is important to reflect where all the electric energy produced by solar and wind farm goes. What is the role of transmission lines, besides distributing electrical energy in the country? This implies geopolitical control in the regions where the energy farms and transmission lines, with cables, are installed. Moreover, it implies the control of large land areas necessary to install renewable energy farms and transmission lines, which is done through processes, of every order (legal, violent, dissimulated, etc), of land commodization.

The land offers to capitalists a nature blessing, which is wind power. Obviously, as seen in a previous topic, the land does not have value. Its value, maximum, resides in its capacity of generating natural or civil fruits (land of rent). In the present case, the fruits involve a technological basis able to transform wind power in electrical energy. So, controlling the land is fundamental in this process, which passes through land commodization again.

When discussing land commodization, it means defining exclusive private property rights in the land. Brazil's agrarian structure is historically marked by irregularities. This implies a pressure to its regularization.

Recently, the law n° 13465/2017 was published, which discusses rural and urban land regularization, and its finality was the land titling, in other words, the definitive concession of property rights through the register of a fair title, apt to transmit will, in real estate registry offices. The land regularization is paired with capital accumulation practices by dispossession, as seen in a previous topic (TRALDI, 2020).

The renewable energies farms expansion is given by the control of large land extensions, through land commodization, and it is paired with capital liberation and labor, social and market rights dismantlement. There is a pressure applied by energy multinational corporations to liberate capital and to deregulate the energy and labor market.

It is a process of financialization of economy, already seen in Brazil by Francisco de Oliveira (2003), since the 60's, because of the necessity to increase profit taxes by forming monetary reserves. Financialization, in the sayings of Manuel Aalbers (2015), involves the penetration of corporations finance practices (be the corporations financial or not) in the State and civil society as a whole, accompanied by institutional arrangements between several agents, markets and technics turned to economies transformation, families and public sectors by financial narratives. Costas Lapavitsas (2011) defends that financialization comprehends three fundamental elements: a) financial capacity acquisition by the big companies, decreasing their dependences on bank loans; b) expansion of banking activities in households; c) insertion of families in the financial market as debtors and creditors.

This refers to the role of foreign investment funds on renewable energies in Brazil. Banks and mostly european and american pension funds (formed with retired people, teachers, railway workers, etc., as well as european countries, EUA, Canada...) help to extract wealth produced by our workforce and send their profit abroad, a true bleeding of our country's borders. They do not produce anything here. They are foreign investors associations, which buy rights in future profits and send them abroad. They act in renewable energies because of carbon credit policies and the possibilities that those new investments bring to capital auto valorization.

One of the ways to absorb capital surplus is to accelerate the circulation the electricity commodity. For the capitalist, any limitations to agreements, any barriers to the free will of negotiation implies in barriers to capital circulation. The last legislation were in the sense of removing the obstacle for the free will regarding patrimony disposition. In the last 5 to 7 years, this happened in a very accelerated way and not only regarding land regulation, using the labor law reform as an example.

In reality, this promotes an unrestrained search and formation of land stock, which involves credit securities, as well as the formation of hedge funds on those credit securities which will be negotiated in the mobiliary value market as if the land were transformed in a financial asset.

This process implies that the capitalist society microsystem, based on the workforce surplus value extraction, also reflects on an international level. The capitalist buys the means of production, the resources to be benefited from and the workforce, as well as employs, manages and extracts of this force a use value as a plus to benefit from and transform the resource in a product to be launched in the market as a commodity to generate an over profit (a plus in surplus value). In a global scale, the extraction of this workforce surplus is done by central countries over peripheric countries by means of foreign capital fixation in the periphery and the transformation of resources and work in surplus value and its transference to the headquarters situated in central countries.

### **3 POSSESSION, PROPERTY, LAND OF RENT AND WIND ENERGY**

According to Marx (2017), the value of land does not reside in the land itself, but in the conditions and production elements that can be extracted through work and appropriation by the means of production owner. Albeit land itself does not hold value, it serves as a basis to the reproduction and heritage of workforce surplus value. The land is considered a non-productive mean of production, providing free natural resources to capitalists, which utilizes them along with the workforce to generate surplus value, expressed in products that are traded in the market as commodities, increasing then is surplus value.

The free use value of land is accumulated by the capitalist without costs, and, through the use of workforce, surplus value is extracted.

The land relates with the area in surplus value extraction and reduction of production costs when: 1) it works as a operation base to generate use value; 2) it is close to consumer markets; 3) it is provided with good routes of circulation; 4) it is subject to little adverse weather and 5) it serves to increase surplus value (HARVEY, 2013).

In the context of the relation between land and capitalist production, the State performs a fundamental role in the form of the legal system. To establish the separation between possession and ownership, the article 1228 of Brazil's Civil Code, that addresses this topic, is used. Moreover, the right to private property is written on the article 5, subsection IV of Law n.º 6015/73, as well as the articles 1227 to 1245 of Brazil's Civil Code.

Those legal structures are considered ideological superstructures that ensure, in Brazilian law context, the capitalist may use the capital in the land to increase the over profit obtained through the exploration of workforce on natural resources freely given by nature.

The positivization of those aspects in our Federal Constitution, Civil Code, Law of public registries and complemented by the Land Statute (Law nº 4504/64) defines the characteristics of land ownership in Brazilian capitalism. Those characteristics include the separation between possession and property in land, leasing of land between proprietaries and capitalists, or the use of areas by the means of rent payment (which is a special form of oath), and the separation between the worker and land possession. The land is transformed in a kind of fictional capital, subject to a future realization, be it through rent, selling product as commodities or selling the land itself.

Considering the characteristics of land ownership in capitalism, it can be said that land of rent is an expression of the right to private property, which always arises from the exploitation of labor, appropriated

by the capitalist. Land of rent is arbitrarily determined by the landowner through a price, either through rent or through sale of the land's production, or even through the sale of the land itself. However, it is enhanced by logistics (location and proximity to markets) and/or technology (investments in science and innovation) (KAUTSKY, 1998).

Land of rent explains how land, even though it is not a product of human labor, can have a price and circulate in the market as a commodity. The interest rate (rent) is the value of the land, even in buying and selling, as what is sold is not the land itself but the right to extract surplus value from the land, the right to a future appropriation of the fruits of labor. The interest rate and future revenues regulate the price of the land. The speculative element affects land rent and arises from the fact that land is fictitious capital, weak capital, whose rent depends on future realization through future labor. Land titling facilitates market transactions regarding future rents and plays a role in accelerating the circulation of capital that yields interest, enabling the absorption of capital surpluses. It is no wonder that the credit system allows the connection of the land market with various forms of capital circulation that yield interest and with industrial capital. The state appears to regulate the price of land and ensure that the land market fulfills its function of coordinating the allocation of land to its uses.

According to Mariana Traldi (2020), for wind energy companies, land seems to be a support for the technology that will convert wind power into electric power. Land of rent for the company is generated by the electricity produced through the appropriation of land and common resources, wind power, and labor, at the expense of the farmers. In return, the farmer receives rent, a bare minimum remuneration which, although related to the company's income from electricity trading, is not subject to control by the farmer. There is an inversion of what would originally be land of rent: the rent charged by the landowner. The problem is that, even considering that the

payment to the farmer is linked to the income derived from electricity trading, farmers receive rents without any guarantee, transparent, and auditable relation with the value earned by the company in the same electricity trade. The rent does not exceed 1.85% of the company's earnings. Often, it does not exceed 1% (it varies between R\$500.00 and R\$3,000.00). In accordance with Mariana Traldi (2020), the use of a formula that links the lease value to the value of the auctioned kilowatt-hour prevents any real approximation of values until the completion of said auction.

Lease and easement agreements are precisely the legal ways that enable the appropriation of land rent by foreign wind energy companies and facilitate processes of accumulation by dispossession, green grabbing, according to Mariana Traldi (2020).

#### **4 POSSESSION, LAND RECONCENTRATION IN THE EXPANSION OF WIND FARMS AND THE CONTRACTS.**

What could be seen in the semi-arid regions of Paraíba and Pernambuco nowadays? Large law firms, representing wind energy companies, harassing farmers, searching for them *en masse*, whether in commercial establishments, churches, squares or other public spaces, asking them to sign rent contracts, giving up the possession of their land for the construction of wind farms.

And those contracts are signed. As already noted (MAIA; FARIAS, 2022), reports point to harassment by representatives of energy companies to get farmers to sign individual or collective land use assignment adhesion contracts for the installation of wind farms, often with the assistance of the lawyers of the company itself, paying low amounts of rent, some reaching a mere R\$ 400.00 per family, with an initial research period of 3 years for wind measurement and, subsequently, the immediate start of long terms of 49 years and

without any wind turbine installation guarantee. Furthermore, due to the technical operation of the wind towers, whether for the correct capture of the force of the winds, or for safety reasons, the contracts impose restrictions on the economic use of the land by farmers and without any compensation for lost profits. Farmers are deceived with promises of real monthly and immediate earnings, job creation and development, which, most of the time, do not come true as expected. They are even forbidden to disclose the terms of contracts with their peers. It involves harassment not only of farmers, but of other extracts of the peasantry, such as traditional communities and peoples, quilombolas and indigenous peoples. Obviously it also happens with large producers.

There are examples, born as a result of observation with farmers, around the steep mountains that surround Santa Luzia, São Jose do Sabugi and Junco do Serido, in the western serido of Paraíba, of a whole situation of penetration by large wind energy companies. These are areas that already host wind farms, where new measuring towers are being installed, and new roads are starting to be opened. This is a region with multiple property situations, from individual farmers with titles of possession, to family farmers and rural credit settlers, land under INCRA control, quilombola communities, and even historic sites with titles of possession. (MAIA; FARIAS, 2022).

The exploitation rights of farmers' land tenure are controlled by large international wind energy companies, which does not necessarily mean property control. Ownership remains with the farmer, but possession of the land, the right to exploit it for a long time, becomes the company's responsibility.

The world is facing a new global process of capitalist expansion and geopolitical reconfiguration, based on the assertion of Anglo-European hegemony. This ends up forcing new divisions of work and production, including agricultural production. The contracts have effects

on the division of labor in agriculture, which is transforming Brazilian farmers into people that live off income. Brazil is experiencing, as in the 1970s, a new objective change in agrarian production relations, a new process of land reconcentration. The semi-arid region faces a “Serra Pelada dos Ventos”, in which the farmer is dispossessed of possession but not of ownership.

It should be noted that the problem does not lie in environmental licensing. Environmental licensing is a law in the formal way, and its objective is to protect and reproduce material legal relationships given by environmental policies. If the environmental policies are wrong, you can have the best environmental licensing in the world, but it will be ineffective, as it is now. However, also, if the environmental policies are adjusted, but the economic policy contains structural flaws, the environmental policy will lack ineffectiveness.

What it means is that there is a chain that culminates in the centrality of this national problem. Environmental licensing, environmental policies, economic policy are one and the same thing and need to be faced according to the problems that prevent the country from solving the historical tasks of its development, namely, agrarian reform, urban reform, the fight against economic dependence on the Brazil in relation to the international centers of capitalism (based on the action of foreign investment capital in the Brazilian economy), overcoming high prices, hunger and extreme poverty, the problem of national security (from the point of view of border security and of the unity in Brazil). So, the local issue needs to be thought from the national problem, the unity of Brazil and the need for recovery of the State. These unfold from the energy problem.

In this sense, Elias Jabbour (2022) (2020) affirms that the urban and agrarian question come together when discussing the problematic of development. Cities demand resources that can only be found in agriculture, livestock and extractivism, that is, in the exploitation of the

land. Historically, investments in agricultural production generate chain effects and the resources needed for investments. China, for example, shows that the technological revolutions that boost its economy were only possible thanks to the development of productive forces in the countryside.

## **5 CHINA'S EXPERIENCE IN WIND AND SOLAR ENERGY**

On the other hand, according to Yao Yang (2022), Dean of the National School of Development, Peking University, China has a continuous advantage in the field of solar and wind energy, because 75% of the components of solar energy are produced in its own territory, and needs the most basic technology. Solar energy has become a mainstay industry in China, with subsidies of 2 trillion yuan in 2015 enabling it to reduce carbon emissions relative to other sources such as natural gas. China has greatly reduced the cost of solar energy, and now the cost of electricity is the same as thermal energy, and could drop by a third in five years. This is a huge contribution to the world.

However, considering that the huge populations of China and India cover nearly two-fifths of the world's population, the international energy agency has estimated that China and India will account for 45% of the growth in the world energy demand by 2030.

China's economic growth over the past quarter century has been spectacular, with an average annual growth rate of 9% unprecedented in recent history. Despite the improvement in energy efficiency, the demand for energy has increased significantly. Especially after 2000, China's energy demand growth rate exceeded the GDP growth rate. The sharp increase in average annual energy consumption has often exceeded the expectations of the Chinese government and its planning agencies. Shortages of energy supplies have become the norm in some parts of China.

In any case, developed countries represent only 20% of the global population, but consume 75% of the world's cumulative emissions. And it is China and the countries of the global south that suffer the consequences of this contradiction. Global warming is just one facet of the global environmental crisis and therefore must be considered in the context of global governance and sustainable development. In many countries, including China, there is a strong emphasis on technological improvement and energy efficiency, which, in the Chinese case, is demonstrated by investments, in the area of the New Silk Road, in renewable energy, including solar, wind and hydropower, by 57%, in 2020, constituting a large part of China's energy investment abroad (CHU DAYE, 2022), but the dominant narrative appoints to Western European countries and the USA as models of sustainable development, which is not quite the reality. Wen Jiayun (2022) points out that 7% to 14% of China's carbon emissions are to supply the USA consumer market.

The core of this dispute is clean energy. China and the USA are competing for global governance, and global values will sooner or later be unified to the point of clean energy, because carbon emissions compromise the planet's basic right to survival and development. In this sense, China has the opportunity to take leadership and carbon distribution into its own hands and establish a distribution system that represents the essential values of the human destiny community (BI JINGYUE, 2022).

The power system is the cornerstone of global governance, and the cornerstone of China's governance in its new era must be green electricity. This direction was set after the 5th plenary session of the 19th Central Committee, when the CPC formulated the second goal of 100 years of striving, and the practice basis is to promote a large green energy project from the industrial level, create a new energy system belonging to China's future governing power and replace the

existing fossil energy system (LIUYUHUI, 2022). For example, in the next 5 years, 400GW of photovoltaic base will be built in Qinghai. China's goal is to reach 80% of non-fossil energy sources by 2060, approaching the goal of achieving so-called carbon neutrality. In 2019, China's new non-fossil power generation capacity surpassed 230 billion kWh, equivalent to 70 million tons of standard coal. China has proposed that by 2030, the total installed capacity of wind and solar energy will reach more than 1.2 billion kilowatts. Adhering to this construction rate, by 2050, China's total non-fossil will be close to 4 billion tons, in line with China's energy consumption of 5 billion standard coal. (needs to be checked)

In this regard, China is well aware that the cost of replacing fossil energy generation with non-fossil energy, especially with renewable energies generation, is decreasing, and, according to IEA estimates, this type of energy generation, especially photovoltaics will likely be the lowest cost source worldwide by 2025.

China promulgated the National Climate Change Programme as early as 2007; announced in 2009 that by 2020 carbon emission intensity would be reduced by 40% to 45% compared to 2005 and that the share of non-fossil energy in energy consumption would be increased to around 20%; announced in 2015 that around 2030 carbon dioxide emissions would peak and peak as soon as possible, and that by 2030 the carbon intensity would be... (something is missing here). In 2015, it was also announced that CO<sub>2</sub> emissions would peak around 2030 and be achieved as soon as possible, carbon intensity would decrease by 60% to 65% compared to 2005, and the share of non-fossil energy would increase to about 20%. After arduous efforts, China's carbon emission intensity in 2020 has dropped by 48.4% compared to 2005, exceeding the voluntary emission reduction target ahead of schedule and making an important contribution to the global control of greenhouse gases emissions (LI JUNFENG, 2022).

## 6 CONCLUSION

The energetic problem and the legal question involve the problem of the constant valuation of the land, the exploitation of the workforce for the production of electric energy, the circulation of energy in the market as a commodity to obtain more money, a plus over the surplus value, which will be appropriated by foreign companies and will result in an outflow of wealth from Brazil. This affects the communities, but it affects, above all, the Brazilian capacity to emancipate itself economically, as a country and as a State.

Brazil is a country of continental dimensions. It will not be able to carry out these tasks without a strong State, which implies the capacity to mobilize public policies and carry out investments. It is essential to think about the local question primarily from the the national problem, taking the centrality of the national question as a guide.

This leads back to the problem of contracts, as they are the center of this process. In law, contracts are pacts recognized by the State in which people can freely agree on interests and rights. The State recognizes everyone's ability to buy, sell and rent and, of course, imposes exceptions in relation to national security, public health and morality. Contracts represent the way to liberalize the circulation of capital. The more I am willing to negotiate, the more I will encourage the circulation of capital.

In the agrarian issue, there is the issue of the Land Statute, which establishes pacts between producers and somewhat inhibits the autonomy of contracting in favor of tenants. However, the large transnational renewable energies corporations are arriving in the semi-arid region not to buy land, but to rent it, taking the place of lessees. But the logic of the Land Statute was the logic of protecting smallholder tenants as the weakest party. In the semi-arid region, it is

happening that small farmers, most of them occupying smallholdings, are renting their land for long periods, 40 to 50 years, extended to heirs, to large foreign companies. The rights to exploit land tenure are assigned to these companies for terms that practically consolidate real control of the property.

Contracts are the driving force behind this and, in order for them to take effect, they need recognition by the State. The idea that, for liberalism, and its versions in neoliberalism and ultraliberalism, the economy lacks state intervention is a chimera. Quite the contrary, ultraliberalism, financialization and processes of capital accumulation by dispossession need the State to legitimize themselves.

The Land Statute legitimizes, under current conditions, the dispossession of the peasantry by foreign wind energy companies. Enables the expropriation of Brazilian farmers by large foreign private corporations.

In this sense, it is essential to change the legal regime of contracts. The current one ends up transforming them into instruments for dispossessing farmers' rights over their lands by renewable energy companies. Lawful practices, often devoid of land grabbing, but supported by the State.

It is interesting to reflect on the social function of property. Ownership is a power, a legal fiction, it does not exist in practice. It is a power to use, enjoy(of), dispose(of) and claim the thing, according to article 1228 of Brazil's Civil Code. This answers an objective question. Who is the ruling class in Brazil? It is the capitalist class, whose only relationship with production is to own the means of production and to manage, through entrepreneurial work, the work process. It does not effectively produce wealth.

But, historically, ownership is linked to the use, to the social and economic disposition of the thing, confusing itself with effective possession. With the rise of the capitalist class as the ruling class, it

was necessary to legally change the logic of property. Ownership was separated from possession and turned into a power of projection, control over possession. The owner becomes the one who has the just title registered in the competent real estate circumscription and not the one who effectively disposes socially and economically of the thing.

The result is the dispossession of the working class from property and the downgrading of possession to second tier. In our society, the completion of an administrative act, the registration of the purchase and sale contract (or another document that proves the transmission of the will) of the property in the notary is enough to exercise the right of property and control possession. Once the ownership of the property is separated, the owner can make the property circulate in the market as if it were a commodity, through legal relationships/obligations of assignment of possession, as in leasing, although, in practice, the property is not a commodity. It is a social metabolism. The social function of property does not address this problem, as technically the use of property results in its circulation in the market and has the main role of absorbing capital surpluses. The most practical thing would be to put this in the perspective of a social function of possession.

Some questions emerge from the conclusions. In the scope of Chinese-Brazilian relations, can China's possession and property regime offer a fairer and less unequal alternative, in relation to Europe and the US, in the social relations of development of renewable energies in Brazil? Considering that China should speed up the construction of a national market for the trading of energy use rights and carbon emission rights and improve the dual control system for energy consumption, how can China help Brazil in negotiating alternatives of contracts that minimize land problems, especially the possession and property rights of lessors *vis-à-vis* Anglo-European energy companies?

Technological revolutions in the productive forces in China allowed the State to develop megastructural renewable energy projects, with constant creation of new use values. For Elias Jabbour (2022), China formed an original rationale in the socialist economy through the permanent realization of demand. The State is the regularity and inducer of new forms of property, including private property, but aimed at subjecting the market to overcoming the social contradictions of capitalism, pre-revolution, inherited by China.

The goals proposed by the 5th plenary session of the 19th Central Committee point, from Brazil's point of view, to the perception that the answer to the problems of renewable energies, due to financialization, is only possible if it is sought in capital control policies and containment of the financial system, which implies a centralized state planning.

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财产和可再生能源的法律制度

**REGIME JURÍDICO DA PROPRIEDADE E ENERGIA RENOVÁVEL**

**LEGAL REGIME OF PROPERTY AND RENEWABLE ENERGY**

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## 摘要

全球变暖和资源短缺推动了一场寻找可持续替代能源的国际竞赛。巴西主要使用水力发电，这是一种可再生能源，但由于干旱，巴西一直难以为其大量人口提供足够的能源。这也是巴西一直在投资其他类型能源的主要原因之一。通过研究新的可再生能源，吸引全球投资。巴西一直在宣传具有高能源潜力的地区，并做出相应规划。本文从法律上分析了能源产业地区的土地问题，从而引起人们对土地保有权规范化的更多关注，使土地具有可再生能源潜力，土地对实施可再生能源产业具有巨大价值。但是，一些地方虽有足够的气候条件，由于土地估价过高，导致出现诸如土地投机、土地掠夺和驱逐当地区居民等现象，或擅自占用和开发土地。这些问题将导致土地在征用出现大量风险。因此，本文旨在探究可再生能源土地权的相关规则，强调土地正规化政策的重要性。

**关键词：** 土地所有权； 可再生能源； 土地正规化

## RESUMO

O aquecimento global e a escassez de recursos alimentaram uma corrida internacional para encontrar alternativas sustentáveis para fornecer energia. O Brasil utiliza principalmente energia hidrelétrica, que é uma fonte de energia renovável, mas, o país, tem lutado por não ser capaz de fornecer energia suficiente para sua considerável população, devido às secas. Esse é um dos principais motivos pelos quais o país vem investindo em outros tipos de energia. O problema da pesquisa de novas fontes renováveis de energia é que, para atrair empresas, o país vem divulgando áreas com alto potencial energético como se a terra não fosse habitada, criam mapas que mostram dados, como, capacidade

de energia eólica, sem informar aos investidores dos habitantes desses lugares, esse é o cerne deste artigo. Esta pesquisa analisa juridicamente a parte fundiária da instalação de parques energéticos, o que leva a uma maior atenção na regularização fundiária em terras com potencial energético renovável. A terra é algo de imenso valor para a implantação de parques de energia renovável, uma vez que apenas alguns locais possuem condições climáticas adequadas, conseqüentemente há uma supervalorização da terra, o que provoca fenômenos como: especulação fundiária, grilagem de terras e expulsão de posseiros. O posseiro vive e produz na terra, mas não tem o título a ela, o que o torna suscetível a injustiças no processo de captura de terras para esses projetos. Como possível solução para a fragilidade dos posseiros destaca-se a importância das políticas de regularização fundiária.

**Palavras-chave:** Propriedade e energia renovável; Posse e energia renovável; Regularização fundiária e energia renovável.

## ABSTRACT

Global warming and resource scarcity have fueled an international race to find sustainable alternatives to supply energy. Brazil uses mainly hydroelectric energy which is a renewable energy source but, the country, has struggled with not being able to provide enough energy for its considerable population, due to draughts. That is one of the main reasons why the country has been investing in other types of energy. The problem with the research of new renewable energy sources is that, in order to attract companies, the country has been advertising areas that have high energetic potential as if the land is unlivable in, they create maps that show things like wind power capacity, without informing investors of the inhabitants of these places, that

is the crux of this paper. This research legally analyzes the land part of the installation of energy parks, which leads to greater attention in land tenure regularization in lands of renewable energy potential. Land is something of immense value for the implementation of renewable energy parks, since only some places have adequate climatic conditions, consequently there is an overvaluation of land, which causes phenomena such as: land speculation, land grabbing and the expulsion of squatters. The squatter lives and produces on the land, but does not have the title to it, which makes him susceptible to injustices in the process of capturing land for these projects. As a possible solution to the fragility of the squatters is highlighted the importance of land regularization policies.

**Keywords:** Ownership and renewable energy; Possession and renewable energy; Land regularization and renewable energy.

## 1 INTRODUCTION

Global warming and resource scarcity have fueled an international race to find sustainable alternatives to supply energy. In Brazil, renewable energy sources account for 83% of Brazil's electricity matrix. The most used is hydroelectric (63,8%), wind (9,3%), biomass, and biogas (8,9%), solar (1,4%). The hydroelectric energy has been historically one of the main energy sources in Brazil, which makes sense since the country owns about 12% of the earth's surface freshwater, with one of the largest river networks in the world (TERRA, 2021).

It is worth to mention that, in total hydropower installed capacity, Brazil is only behind China, according to the 2020 Hydropower Status Report, Brazil surpassed China as the largest single contributor of added capacity in 2019 with 4,919 MW. This was mainly attributed to the

completion of the 11,233 MW Belo Monte hydropower plant, which has provided electricity to around 60 million people (TERRA, 2021).

Even though hydroelectric energy is a renewable energy source, Brazil has struggled with not being able to provide enough energy for its considerable population, due to draughts that lower the amount of water therefore the amount of energy a hydroelectric park can produce. That is one of the main reasons why the country has been investing in other types of energy, the main one being wind power (TRALDI, 2019).

The problem with the research of new renewable energy sources is that, in order to attract companies, the country has been advertising areas that have high energetic potential as if the land is unlivable, they create maps that show things like wind power capacity, without informing investors of the inhabitants of these places, that is the crux of this paper (TRALDI, 2019). A proof of that is that, as seen in Terra (2021), earlier 2020 it was revealed Brazil had shot up the EY Renewable Energy Country Attractiveness Index (RECAI) rankings by three places from 19th to 16th position and in the next edition, RECAI rankings announced the country is in 15th place. RECAI ranks the top 40 countries in the world on the attractiveness of their renewable energy investment and deployment opportunities, this proves that the country is rapidly rising on the rankings which is a dreadful news to those who live in areas of high renewable energy potential, especially those without the property of the land they inhabit.

This research is justified by the need for studies that legally analyze the land part of the installation of energy parks, which leads to greater attention in land tenure regularization in lands of renewable energy potential. The solutions found, including for global warming, always involve opening new fronts for capitalist expansion, especially for financial capitalism, in areas of lower market value and where farmers,

generally squatters, do not hold their property titles, which puts them in a situation of fragility in the face of the desires of capitalism.

The State's logic, in accord with corporations, of affecting traditional communities and negate their right to land tenure, as well as to exercise their rights as citizens, makes local social groups invisible through the perception of territory as a depopulated space, available for economic interventions of large projects, as in the case of wind power generation, by denying the geographic location of communities (TRALDI, 2019).

Land is something of immense value for the implementation of renewable energy parks, since only some places have adequate climatic conditions, consequently there is an overvaluation of land, which causes phenomena such as: land speculation, land grabbing and the expulsion of squatters. The squatter lives and produces on the land, but does not have the title to it, which makes him susceptible to injustices in the process of capturing land for these projects.

And the impact of implementing these companies goes beyond what is listed above, when analyzed from the squatter's point of view. Although studies carried out in the Brazilian estate of Ceará state that wind farms can coexist with various economic activities and that landowners are not displaced, and can increase productivity through the payment of resources, such as royalties and rents (noting that the payment royalties from wind farms is unprecedented in Brazil, but has already occurred in the United States, as demonstrated by Gorayeb, Brannstrom and Meireles (2019)), it is clear that this only occurs where there is security of land tenure and legal stability of property, a fact that does not exist in the case of Brazilian squatters (LIMA, 2009; CEARÁ, 2001).

As a possible solution to the fragility of the squatters, the importance of land regularization policies is highlighted and from this, arises the main axis of this work to investigate whether the laws that

govern property, favor abuses by renewable energy companies towards the inhabitants of the areas in which they wish to settle, especially those who are in possession, thus criticizing the current process of land tenure regularization in areas of energetic potential.

The fundamental problem of this work is the inability of the current property regime to protect squatters in the process of installing renewable energy parks. Which leads us to the following questions: How does the Brazilian property legal regime affect the installation of renewable energy parks?

The objective of this essay is to investigate whether the laws governing property favor abuses by renewable energy companies towards the inhabitants of the areas in which they wish to settle, especially those in possession.

The method adopted has a focus on Mariana Traldi's thesis, which deals with the privatization of winds to produce wind energy in the Brazilian semiarid region. The importance of Traldi's ideas is related to the use of accumulation by dispossession in the land issue and in the economic exploitation of land in the process of installing renewable energy parks. The research methodology involves collecting and processing data from legislation, jurisprudence, books and scientific articles related to the topic. The work will be an investigation of the current legislation, with a focus on the Land Regularization Law (Law 13.465/2017).

The hypothesis that we will investigate is whether the negative effects of the implementation of renewable energies, in terms of land, could be remedied with previous land regularization, based on the idea that those who own the land have greater legal security, especially, in the lease process and thus the regularization would fulfill the reason for which it was created.

## **2 LAND REGULARIZATION AS A CONDITION FOR THE INSTALLATION OF RENEWABLE ENERGY PARKS**

Although wind is a non-exhaustible natural resource, in order to capture it, using current technology, it is necessary to install wind turbines on large tracts of land, and these places need to be able to capture the greatest amount of wind possible. The same occurs with solar energy, there is a need for land with high energy capture potential. Taking this into account, only a few places would have the ideal conditions to produce this type of energy, thus making the land a valuable resource for this industry. As Traldi (2019, our translation) said: “control of energy sources is nothing more than control over territories that have these natural resources. Therefore, talking about energy production is talking about the appropriation and control of territories”.

To talk a bit more about solar energy in Brazil, it is valid to know that although it is not the main renewable energy of the country, does not mean that Brazil lacks solar power potential, in fact, as of 2021 according to Terra (2021), Brazil one of the greatest solar energy potential of all countries in the world, receiving excellent levels of sunshine throughout the year, from less sunny areas in the South to the sunniest in the Northeast. This quality generates a capacity factor of 19% to 24%, which is 2x higher than the average in Germany, one of the current world leaders in the use of photovoltaic energy (TERRA, 2021).

The author also states that:

Despite the slowdown in the economy due to the COVID-19 pandemic, solar energy has grown in Brazil. In the third quarter of 2020, the use of this source advanced 25% compared to the same period in 2019, according to data from the National Electric Energy Agency (ANEEL). Globally, IRENA predicts that solar energy will grow on average by 13% per year from 2020 to 2030.... Thus, the installed capacity of solar energy in Brazil increased from 415MW in the third quarter of 2019 to 520MW in the same period of this year. The state of Minas Gerais was at the top of the installed power ranking, followed by São Paulo. (TERRA, 2021)

For a company to use the land, it needs to prove, to the National Electric Energy Agency (ANEEL), that it has permission to do so, and then it can sign a lease agreement and build in the authorized area. The problem is that one of the requirements is the registration of the lease by the property registration office. For this, the area must be free from invasions, litigation, liens and any other legal burden or impediment, under penalty of making the execution of the contract unfeasible. The lease contract could only be entered, therefore, with whoever owns the land title and on condition that it is in good standing, without any legal impediment (DINIZ, 2006, p. 559).

It is there, then, that land regularization gains prominence, since it would grant the right to property to those who only have the possession, and thus, farmers could lease land to companies. Land tenure regularization is the instrument whose objective is to transform a right of possession, as stated in art. 1200 of the CC, in a tenure right that can be recognized as a property right (art. 1228 of the CC), so that the squatter can guarantee his access to land with dignity and can participate in public policies and consolidate exploitation rights over the land. earth (TARTUCE, 2018). Regularization can be initiated by the State, if the land is public, or by the squatter, if it is private.

Land tenure regularization encompasses different matters that converge to transform possession into a property right, consequently it does not have a single rule, but several legal provisions. There are the Constitution, the Civil Code and the Land Statute, worth noting the importance of Law n° 13465/2017, which amends several rules on rural land regularization, including the agrarian reform law (Law n° 8629/1993), the land regularization law on Union lands in the Amazon (Law No. 11,952/2009), the law of credit payment by agrarian reform settlers (Law No. 13,001/2014), among others (MOTA, TORRES, 2022).

Land regularization has a cost, there are aspects of environmental licensing that will demand resources, and land credit can be used to solve this problem. Energy companies also have access to this resource and use it to justify the social function of the land, which is nothing more than to justify that the land is being used to its maximum potential, thus contributing to economic development.

The idea of land credit would be to help the life of the farmer, but it is a resource used by foreign wind energy companies, which already have billions of dollars, to expand their capital. According to Mariana Traldi (2019):

...the wind lease contracts, given their long durations and the restrictions on use they impose on landowners, subvert the logic of agrarian reform and policies for accessing land credit, aimed at serving farmers with little or no land, and reconcentrate the land in the hands of a restricted group of wind generation companies. On the other hand, settled workers benefiting from land credit programs, deprived of any and all support, whether technical and/or economic, and infrastructure to produce and sell their production, find themselves with no way out in the face of the opportunity to obtain an income that many call it extra, but in many cases it

becomes the main income of families, given that it is the only fixed income guaranteed to them. In other words, the non-guarantee of minimum conditions to produce for settlers in rural settlements or small rural producers, which precede the arrival of wind generation companies in the Brazilian semi-arid interior, puts these families in a condition of dependence on interests and economic power. not only wind generation companies, but also real estate companies that broker leasing contracts; as well as the political and economic power of local and regional elites, and the action of intermediaries and putting at risk, even the hard-won right of access to land (TRALDI, 2019, our translation).

The social function is a requirement that must be fulfilled by the squatter and the owner, as provided for in art. 5, item XXIII, of the Federal Constitution which says: “the property will fulfill its social function” (MOTA; TORRES, 2021, our translation). Art. 186, of the same legal diploma, specifies the social function for rural property, saying:

The social function is fulfilled when the rural property simultaneously meets the following requirements, according to criteria and degrees of requirement established by law:

IV. - rational and adequate use;

V. - adequate use of available natural resources and preservation of the environment;

VI. - compliance with the provisions that regulate labor relations;

VII.- exploitation that favors the well-being of owners and workers (BRASIL, 2022, our translation).

The legal principles that guide land tenure regularization, based on the principle of the social function of property, are highly

open, non-descriptive norms that do not clearly indicate who they benefit, but involve a goal to be followed. They are: the dignity of the human person; eradicating poverty and marginalization and reducing social and regional inequalities; isonomy; social justice; sustainable development; and legal certainty (TARTUCE, 2022). These are principles of paramount importance in the situation between squatters and renewable energy companies. As they lack descriptiveness, they have low effectiveness and cannot effectively reproduce the social relationship involving the property right, which they intend to regulate.

Land tenure regularization instruments are legal and political means that the Union, States and Municipalities use to face the various land irregularities and ensure the legal security of tenure to the population (INSTITUTO JONES DOS SANTOS NEVES, 2008). They differ from the principles, in essence, because they do not have the flexibility that they have, the instruments are more plastered, they do not have as much possibility of being molded for the application in the concrete case, they are applied the way they exist.

Among the instruments of rural land regularization are: expropriation for the purpose of agrarian reform, art.184 of the CF; generic expropriation, art. 5, item XXIV of the Federal Constitution; the purchase and sale; the donation; the concession of real right of use, art.18 of the agrarian reform law (law n. 8624/93). In this case, only some of the powers of the property right are transferred, such as the right of use, but the availability and control remain with the State, normally this instrument is received by land reform settlers (PEREIRA, 2017).

Another instrument that deserves to be highlighted is adverse possession, being one of the best known by the general population, rural adverse possession is provided for in art. 191 of the CF, in arts.1,238 and 1,239 of the Civil Code and in art. 2 of the Land Statute. Rural adverse possession is a technique in which someone who does not

own the property, but has possession, proves in court that he has the right to acquire the property over time, proving the social function of the land (PEREIRA, 2017).

These being the main characteristics of land tenure regularization, an extremely important instrument in the process of installing renewable energy parks, since due to the country having a structure marked by irregularity, there is a low definition of property rights, which imposes a regularization procedure. so that those who use the land have the power to dispose of it as they wish, for example, by leasing.

### **3 THE LAND REGULARIZATION PROCEDURE IN THE PRODUCTION OF CONTRACTUAL LEGAL EFFECTS FOR THE INSTALLATION OF RENEWABLE ENERGY PARKS**

The land tenure regularization procedure for the lands where the parks will be installed is influenced by two laws, Law No. 10.438/2002 that regulates tax reduction for the installation of renewable energy parks, and the decree No. 5.025/2004 that regulates investments in foreign technologies for the installation of renewable energy parks. Law No. 10,438/2002 provides exactly for:

...the expansion of emergency electricity supply, extraordinary tariff recomposition, creates the Incentive Program for Alternative Electric Energy Sources (Proinfra), the Energy Development Account (CDE), provides for the universalization of the public energy service 9,427, of December 26, 1996, No. 9,648, of May 27, 1998, No. 3,890-A, of April 25, 1961, No. 5,655, of May 20, 1971, No. 5,899, of July 5, 1973, No. 9,991, of July 24, 2000, and other provisions (BRASIL, 2002, our translation).

While the decree No. 5.025/2004 discusses:

Regulates item I and §§ 1, 2, 3, 4 and 5 of art. 3 of Law No. 10,438, of April 26, 2002, in the provisions on the Incentive Program for Alternative Sources of Electric Energy – PROINFA, first stage, and other measures (BRASIL, 2022, our translation).

These two legal provisions deal with PROINFA, one creating and the other regulating it, PROINFA being the Incentive Program for Alternative Sources of Electric Energy. According to the website of the National Electric Energy Agency (ANEEL), it can be described as:

PROINFA aims to increase the participation of alternative renewable sources (small hydroelectric power plants, renewable energy parks and biomass thermoelectric projects) in the production of electric energy, favoring entrepreneurs who do not have corporate ties with generation, transmission or distribution concessionaires (ANEEL, 2022, our translation).

These legal provisions direct the installation of renewable energy parks, which takes place as follows: first there is the public call and then the contracting through electricity energy auctions seeking to supply the country's energy needs; after the announcement of the auctions by the National Electric Energy Agency (ANEEL), the Energy Research Company decides which generators are eligible to participate in the process; then the Electric Energy Commercialization Chamber selects and contracts the project with the lowest price. It is worth noting that before any investment in the wind sector, the company must carry out an in-depth study on the climate of the desired location, with a measurement of 36 months.

Environmental licensing is one of the steps required for the establishment of a wind farm in Brazil, requiring the company to have access to the land it intends to use. Thus, it is at this stage that negotiations between energy generation companies and landowners are carried out. Emphasizing that, for the land to be leased, it is necessary that the possession of the same is without vices and the act can only be performed by the one who has the property title.

It should be noted that this entire process is marked, as seen in the work of Mariana Traldi (2019), by elements such as dispossession, expulsion of squatters, land grabbing, land price inflation, appropriation of land for common use by the community, political pressure to sign contracts, intimidation of residents by companies, the local elite and intermediaries.

The contract is governed by private law rules, such as the Land Statute and the Civil Code. It should be noted that the lease agreements were designed to protect the rights of those who are leasing the land, following the logic that the owner would have more power in the contractual relationship, but this is not the case in leasing land with energy potential. As a rule, a landowner is not on an equal footing with a company, because in the Brazilian semiarid conditions, marked by small properties and smallholders, the owners are farmers with little purchasing power. Thus, lacking contractual negotiation power, in order to obtain favoritism. All this is well described and analyzed by Mariana Traldi (2019).

A key point of this process is that the lease must be registered in the registration of the property at the local property registry office, and in this it is required that the squatter also has the title to the property. Due to this, in order to have access to land and carry out environmental licensing, companies often offer legal assistance to the squatter, as a result of a company's need to access land. However, it is a procedure, most of the time, marked by vices of consent (TRALDI, 2019).

After confirming access to the land, the environmental licensing can proceed and then the land is georeferenced within the parameters established by the Institute of Colonization and Agrarian Reform – INCRA; the issuance of a Rural Property Registration Certificate (CCIR) is requested, a survey of the property’s status is also carried out at the Federal Revenue Service and the regularization of taxes due, when necessary.

It should be noted that with the simplification of the environmental licensing process, the company itself can seek the responsible body to regularize the lands it intends to explore, as long as it is formally authorized by the owner, thus, the company appropriates the land regularization mechanism and the uses for the expansion of its capital.

## **4 CONCLUSION**

The inequality in the Brazilian land tenure structure and the ineffectiveness in the use of public policies for land regularization condition the rural man, who needs the land, to take possession of land without having title over it, in turn, the insecurity of tenure puts him at risk. vulnerability position. With the arrival of renewable energy generation companies, this situation is perpetuated, as seen in the previous topics.

Lease contracts are documents that grant the use of the land to others, therefore, they can only be signed with those who own the property, as is customary. In cases where there is a transfer of ownership, it is necessary to register the contract at a notary’s office, which is where proof of ownership is required. Therefore, energy companies can only enter into lease agreements with landowners. These, as they have the security of land tenure, in theory, would have room to negotiate with the companies.

However, in situations of insecurity in tenure, as a rule in Brazil, injustices occur, squatters suffer from pressure from local elites, land grabbing, pressure imposed directly by wind companies, and are manipulated into ceding possession of their land in exchange for titling with land regularization. These are practices that configure dispossession. This is even a customary practice, companies offer legal assistance for the regularization of land in order to use the institute of land regularization, which was created to provide the title of ownership to those who need it, to benefit the company and perpetuate the capitalist exploitation of natural resources.

As well described by Traldi (2019):

.... it is necessary to remember the situation that preceded the arrival of wind generation companies, the enormous inequality in the distribution of land, the difficulties faced by small rural producers in accessing credit, inputs, infrastructure, combined with the edaphoclimatic conditions of the region. region already imposed enormous difficulties on this group for their subsistence and, more broadly, their survival. These are the owners who will have the greatest difficulty in bargaining and seeking better contractual conditions, as their socioeconomic situation does not allow them to run the risk of losing the opportunity to guarantee a fixed income, even if very low when compared to the gains made by the wind generation (TRALDI, 2019, our translation).

Land tenure insecurity also creates barriers to the development of economic institutions, such as contracts, regulations and statutes, that could better distribute the benefits of wind energy. Companies in this segment also promise a minimum wage; they say that the farmer will still be able to use part of the land, which tends to be different in practice; and omit information on the loss of rural retirement and

on the possibility of applying for land credit. It is information denied to farmers that companies use to their advantage.

Regarding the aspect of economic gain for companies, in general, it is clear how this relates to negative aspects in the life of the community with the arrival of companies, among these are: pressure from companies to sign contracts, political reception of enterprises, lobbying policy to attract potential lessors, lack of company considerations (social, economic and environmental), low generation of formal jobs, lack of transparency in negotiations, difficulty in raising awareness among owners and/or squatters, impact on overvaluation in the real estate sector (pressure real estate) and lack of public policies in rural areas.

It is possible to identify that, in the short and medium term, renewable energy generation plants create apparent economic benefits, benefiting from areas that are often punished by the climate, which makes agricultural production difficult, due to unemployment and lacking government assistance. But these are just appearances of benefits. The reality is that famine, unemployment, lack of public policies for agriculture, the dismantling of agricultural production itself and unfavorable weather conditions, common factors in Brazil, make communities vulnerable to contractual exploitation by energy enterprises. Promises of an easy income for families appear, but far below what companies can offer, with harassment of farmers, in areas of interest, so that they sign contracts in precarious and unequal negotiation conditions, with little or no compensation for the impacts caused. by renewable energy generation companies.

About the claim these companies have of creating new jobs in the community, while Terra (2021) said:

With over 1 million vacancies in the sector, Brazil is one of the largest job creators in renewable energy and the opportunities in the segment are increasing. ... According to Irena, the International Renewable Energy Agency, the country is only behind China in number of jobs added. ... These include jobs related to biofuels, hydroelectric, wind and solar energy, as well as biomass and biogas. But it is not a total surprise. Since 2018, the country has the highest number of renewable energy jobs in Latin America. (TERRA, 2021)

Research done by Traldi(2019), states that it is true that jobs are created, but the communities only benefit from that during the construction of the parks, because they, usually, hire people from outside of the community that have a higher qualification. Traldi(2019) goes on by stating the problems brought with the arrival of this new people in the community, some of them being: the high on rent prices, due to more people needing to rent; people complained about these newcomers disturbing the peace, by partying, drinking, and having disorderly behavior; there is a serious problem with them getting involved with girls in the communities, getting them pregnant, then leaving, thus creating a phenomena called "filhos do vento" ( sons of the wind) (TRALDI, 2019).

Often, farmers who live in regions of interest for the production of this type of energy are unaware of the impact of energy park facilities on the community. The environmental impacts are lessened, either due to ignorance or, mainly, in favor of earning some income on an apparently inhospitable land and without incentives. The companies take advantage of the vulnerability of the majority of the population, they do not offer any significant return that lives up to the profit that the companies will obtain with the exploitation of the natural resources, existing there. It is a process without transparency and without an honest dialogue with the community.

Among the negative points about the construction of parks are the political articulation of elected representatives to facilitate community acceptance; the use of company intermediaries to facilitate the signing of contracts and harass farmers to sign them, promises of payment of a minimum wage to the farmer who only signed the contract, without any clarification on the legal effects on their possession and/ or on your land ownership.

This is in line with what is described by Moema Hofstaetter (2016, p. 88), who claims that it is common to use a middleman, usually someone known by the community, hired by the company to convince farmers to accept wind farms. Intermediaries tend to participate in the negotiation of contracts and when they are signed, they are financially rewarded (HOFSTAETTER, 2016).

Squatters cannot face this situation without efficient public policies to ensure proper implementation of land tenure regularization; a gap is opened for capital to appropriate this instrument to expand the economic exploitation of natural resources, also appropriating, in this process, the income from the land, which should be with the farmers.

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中国可再生能源项目用地制度调整与改进方向

**AJUSTE INSTITUCIONAL E MELHORIA NA DIREÇÃO DE USO DO  
SOLO PARA PROJETOS DE ENERGIA RENOVÁVEL NA CHINA**

**INSTITUTIONAL ADJUSTMENT AND IMPROVEMENT IN THE  
DIRECTION OF LAND USE FOR RENEWABLE  
ENERGY PROJECTS IN CHINA**

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## 摘要

在中国，土地空间规划、征收制度改革、工业用地市场配置和城乡统一建设用地市场的共同推进，促使土地供应和土地利用制度从扩大增量向存量、集约高效转变。在新发展理念引导的土地转型背景下，可再生能源项目的土地利用在传统的行政用地供应和严格的用途管制制度之外，逐渐形成了租赁、地役权等多样化、差异化的土地利用制度安排，凸显了私权配置的属性。在严格限制征收土地供应的基础上，未来的立法需要提高以用途复合为核心的用途控制制度的严格性和刚性，完善以物权和债权为核心的土地使用权配置制度。

**关键词：**可再生能源项目；土地使用管制；集体建设用地入市；土地使用权租赁

## RESUMO

Na China, a promoção conjunta de planejamento especial de terras, reforma do Sistema de expropriação, alocação do mercado de terras industriais e o Mercado unificado de construção urbana e rural estimulou o sistema de fornecimento e uso de terras para mover-se da expansão em quantidade gradual para o inventário de estoque, orientado para intensificação e eficiência. Sob o cenário da transformação de terras guiado pelo novo conceito de desenvolvimento, o uso de terras por projetos de energias renováveis tem gradualmente formado um diversificado e diferenciado arranjo desse Sistema como arrendamento e servidão, os quais destacam os atributos da alocação de direito privado, em adição ao estoque de terras administrativas tradicional e sistema de controle estrito do uso. Com base na limitação rigorosa do estoque de terras através de expropriação, a futura legislação precise melhorar

a severidade e a rigidez do Sistema de controle de uso com a essência do uso composto, e aperfeiçoar o sistema de alocação de direitos reais sobre a terra e direitos dos credores.

**Palavras-chave:** Projetos de energias renováveis; Controle do uso da terra; Terra para construção coletiva no mercado; Direito de arrendamento do uso da terra.

## ABSTRACT

In China, the joint promotion of land spatial planning, expropriation system reform, industrial land market allocation, and unified urban and rural construction land market has prompted the land supply and land use system to move from expanding incremental quantity to inventorying stock, oriented to intensification and efficiency. Under the background of land transformation guided by the new development concept, the land use of renewable energy projects has gradually formed a diversified and differentiated land use system arrangement such as leasing and easement, which highlights the attributes of private rights allocation, in addition to the traditional administrative land supply and strict use control system. Based on strictly limiting the land supply through expropriation, the future legislation needs to improve the strictness and rigidity of the use control system with the core of use compound, and perfect the land use right allocation system of real right and creditor's right.

**Keywords:** Renewable Energy Projects; Land Use Control; Collective Construction Land into the Market; Lease of Land Use Right.

# 1 THE LEGISLATIVE LAYOUT AND COMBING OF THE LAND USE SYSTEM OF RENEWABLE ENERGY PROJECTS IN CHINA

## 1.1 CURRENT STATUS OF LEGISLATION

Under the system of rights of land under state ownership and collective ownership established by formal legislation such as the *Constitution*, the *Civil Code* and the *Land Management Law* of China, the land used for construction of renewable energy projects is generally divided into two different cases: state land and collective land.

### 1.1.1 RENEWABLE ENERGY PROJECTS LAND ON STATE - OWNED LAND

(1) The legislative basis for the use of state-owned construction land for the project

As far as the private law aspect of right creation is concerned, the source of the right to use state-owned land for renewable energy projects is the underlying land use right. Under the property right system in which the real right and the creditor's right are divided into two parts in China, the property rights approach is to acquire land use rights through both business land concessions and public interest land allocations, as stipulated in Article 347 of the *Civil Code*. The debt approach mainly refers to the acquisition of the right to use construction land through leasing. Considering the application, the renewable energy projects are implemented with the land supply method in which the right in rem method is the rule and the lease method is the exception.

On the public law level of land use planning control, the provisions of Article 38 of the *Urban and Rural Planning Law*: “In urban and town planning areas to provide state-owned land use rights by way of transfer, before the transfer of state-owned land use rights, the city and county people’s government urban and rural planning departments shall, in accordance with the detailed control plan, propose the location, nature of use, development intensity and other planning conditions of the land to be transferred as part of the contract for the transfer of state-owned land use rights. Not determining the planning conditions of the plot, shall not transfer the right to use state-owned land”. According to this provision, the premise of renewable energy project land is to strictly comply with the planning conditions set by the detailed control plan.

## (2) Commentary

Whether it is transferring or allocation, there is a non-adaptive problem of rigid system design for the land demand of renewable energy projects. Using transferring as an example, the land subject of the project needs to pay the land transfer fee at one time, as well as generate a large capital investment cost and economic burden in the early stage of project development and construction. The transfer period is up to several decades, the term is fixed and cannot be adjusted at will; the land supplied according to the planning is often large and cannot adapt to the small and flexible land demand, resulting in idle and inefficient use of land. Therefore, this kind of state-owned land supply mode is difficult to adapt to the actual demand of the construction of renewable energy projects, so it is necessary to introduce a more flexible land-use right system design.

## 1.1.2 RENEWABLE ENERGY PROJECTS LAND ON COLLECTIVE LAND

- (1) Current status of legislation on the use of collective land for projects

Prior to the amendment of the *Land Administration Law* in 2019, collective land was subject to a strict use control policy, and collective construction land could only be used for the construction of residential bases for villagers' residences and land for public welfare facilities; the rest of business construction activities could only be resolved through the state-owned land supply system after its conversion to state-owned land by expropriation. In other words, through the expropriation system to complete the transformation of land ownership, is the only legal way to use collective land for renewable energy projects. As an implementation, *Wind Farm Project Construction Land and Environmental Protection Management Interim Measures* Article 8 further clarifies: "After the wind farm project is approved, the project construction unit shall apply for the use of land in accordance with the law, involving agricultural land and collective land, shall go through agricultural land conversion and land expropriation procedures in accordance with the law ". At this stage, the compensation standard for expropriation is based on the original production multiplier method, and the original village collective cannot share the value-added income obtained from the conversion of land use. At the same time, the implementation cost of the expropriation system is larger for renewable energy projects that occupy a small, non-permanent area.

Following the amendments of the *Land Administration Law* in 2019, the reform of the expropriation system toward "substantial public interest objectives" and the market entry of collective business construction land has contributed to a shift in the use of collective land

for renewable energy projects. The general direction of the system is to limit the use of expropriation as a system of administrative change of land ownership and to adopt a negotiated agreement model. As far as the expropriation system is concerned, Article 45(1) of the revised *Land Administration Law* strictly restricts the prerequisites for the application of the expropriation system, and only “*the land required for the construction of energy and other infrastructure facilities organized and implemented by the government*” can be expropriated for collective land according to the law. In other words, the use of the expropriation system to solve the renewable energy project land must meet the starting conditions of “*implementation by government organizations and really need*”. As far as the entry of collective commercial construction land into the market is concerned, the *Land Administration Law* has changed the provision that collectively-operated construction land should not be used for operational purposes. Article 63 stipulates that

the overall land use planning and urban and rural planning are determined to be industrial, commercial and other operational purposes, and the collectively-operated construction land registered according to law, the land owner may be transferred to the unit or individual for use by means of transfer or lease, and shall sign a written contract stating the land boundary, area, construction period, use period, land use, planning conditions and other rights and obligations of both parties.

Taking into account the combined effect of this regulation and the expropriation system, renewable energy projects in line with village planning, the village collective can obtain land use rights through the transfer and lease of collectively-owned construction land for business purposes.

## (2) Commentary

With the further development of the integration of urban and rural construction land market, the land supply mode and the right base of renewable energy project land have been changed. On the one hand, the start of the expropriation must be based on the actual needs of public interests, which means that the scope of application of the expropriation system for renewable energy projects is largely limited, and only renewable energy projects that can be classified as important infrastructure construction can be started through the expropriation system. On the other hand, the collective commercial construction land has become a new right base for the construction of renewable energy projects on the collective land. The concession and lease of collective business construction land has become a superior alternative. However, it is necessary to point out that collective business construction land is limited in quantity and scope due to the strict control on the conversion of agricultural land use, the allocation of residential bases for villagers' residence, and the untimely vacating of idle land.

## **2 REFORM AND EXPLORATION OF LAND USE SYSTEM FOR RENEWABLE ENERGY PROJECTS IN CHINA**

### **2.1 CENTRAL-LEVEL POLICY REGULATORY DOCUMENTS**

#### **2.1.1 STRENGTHEN THE LEASING SYSTEM AND GIVE FULL PLAY TO THE ADVANTAGES OF THE FLEXIBLE AGREEMENT OF LEASING RIGHTS**

In addition to the traditional supply of state-owned construction land in rem type of concession, explore diversified land supply methods oriented to include renewable energy projects and land for emerging

industries. Article 3 of the *Opinions on Supporting the Development of New Industries and New Businesses to Promote Land for Mass Entrepreneurship and Innovation* stipulates: Encourage the supply of land to SMEs in various ways such as leasing. Actively promote the first rent after concession, concession combined with supply. If the supply of land by means of first lease and then transfer involves bidding and auction listing, the bidding and auction listing procedure can also be implemented during the lease supply, and the land that meets the conditions at the end of the lease period can be transferred to transfer.

Article 16 of the *Guidelines on the Implementation of Industrial Land Policy* (2019 Edition) stipulates that industrial land can be supplied in a long-term lease; first lease and then concession; lease and concession combination; and flexible annual mode. Long-term lease means that the entire land is used by way of lease throughout the contract period. Long-term lease refers to the use of the whole land in the whole contract period. Rent first and then transfer refers to the supply mode that the place first provides land by leasing, and the lessee invests in the industrial land project to meet the agreed conditions and then transfers it. The combination of leasing and leasing refers to the supply mode that the local government first provides land by leasing, and the lessee invests in the industrial land project to meet the agreed conditions, and then maintains part of the land for leasing and part of the land for transfer. The elastic period refers to the supply mode of the whole land to be sold for the use period lower than the statutory maximum period of the state-owned construction land use right for the corresponding use. Among them: the use of land in the form of long-term lease shall be carried out in accordance with the provisions of the *Opinions on Regulating the Lease of State-owned Land*, and the lease term shall not exceed 20 years. The use of land in a combination of lease, the lease part of a single contract time limit shall not exceed 20 years, though it can be renewed. In accordance

with the law, must be put up for sale by tender, auction and listing of state-owned construction land use rights of the land to be leased first. Then, let the combination of lease, tender, auction and listing procedures can be implemented in the lease supply, the lessee to use the leased land to reach the contract conditions after the need to go through the transfer procedures, the agreement can be taken to transfer.

Explore the use of leasing state-owned unused land for photovoltaic power generation projects land supply methods to reduce the early cost of the project investment.

## 2.1.2 REVITALIZATION OF IDLE STOCK OF LAND

According to the duration of the land occupation and other circumstances, specific types of land use policies to support the development of new business. Therefore, distinguishing “not occupying land, not changing the surface form” and “occupying permanent land”.

*The Power Project Construction Land Indicators (wind farms)* in accordance with the functional zoning of wind power project land is divided into five categories (including wind turbine and unit substation land, power collection line land, boost substation and operation management center land, traffic engineering land and temporary land), for the occupation of permanent land projects, should apply for construction land approval procedures. And for the use of unused land wind power projects, the land does not occupy the land, do not change the surface form of the land part may not change the land use, to lease and other ways to obtain land. According to Article 8 of the *Guidelines for the Implementation of Industrial Land Use Policy* (2019 Edition),

localities should actively guide the reasonable location of industrial projects based on territorial spatial planning, make use of unused land

and stock construction land, etc. as much as possible, not occupy or occupy less arable land, and strictly protect permanent basic farmland.

Photovoltaic, wind power generation and other projects using the Gobi, desert, barren grassland and other unused land, the part of the land that does not occupy the land, does not change the surface form, can be identified according to the original land type, does not change the land use, and is marked in the annual land change survey. The land is allowed to be obtained by leasing, the two parties sign a compensation agreement, and the land is reported to the local county-level land and resources department for record. At the same time, the use of Gobi desert and other unused land to build photovoltaic power generation projects, in the land planning, planning arrangements to be moderately tilted. If the land conversion is not involved, the annual plan index of land may not be occupied.

### **2.1.3 ALLEVIATION OF RIGID AND UNITARY CONTROL OF PLANNED USES THROUGH COMPOUNDING USES OF CONSTRUCTION LAND**

New energy vehicle charging facilities, mobile communication base stations and other small land areas and needed multi-point distribution of new industrial supporting infrastructure are able to take the allocation of land supply. When supplying land for other related construction projects, the construction requirements are included in the land use conditions. After the land is supplied, the relevant rights holders shall clarify the property rights relationship of supporting facilities according to law.

*The Interim Management Measures for the Development and Construction of Decentralized Wind Power Projects* stipulates in Article 13:

On the premise of meeting national environmental protection, safety production and other relevant requirements, development enterprises may use their own construction land (such as park land), or rent other units of construction land to develop decentralized wind power projects.

#### 2.1.4 ALLOW A SPECIFIC RANGE OF RENEWABLE ENERGY PROJECTS ON GENERAL CROPLAND CONSTRUCTION

According to the *Opinions on Supporting Photovoltaic Poverty Alleviation and Regulating Land Use for Photovoltaic Power Generation Industry*, for photovoltaic power generation projects constructed in the poverty alleviation of deep poverty-stricken areas, the photovoltaic power generation projects within the scope of the construction scale of the national village-level photovoltaic poverty alleviation power station determined by the National Energy Administration and the Poverty Alleviation Office of the State Council and the photovoltaic composite projects that meet the local construction requirements and identification standards, if the photovoltaic array uses agricultural land other than permanent basic farmland, it may not change the nature of the original land without destroying agricultural production conditions. Among them, agricultural land, unused land in accordance with the results of the land survey identified, photovoltaic array land area in which *Photovoltaic Power Station Project Land Control Indicators* approved.

The specific special provisions for the land use of photovoltaic poverty alleviation projects and photovoltaic power station projects using agricultural land composite construction include, first, if a photovoltaic array uses agricultural land other than permanent basic farmland, the nature of the original land use may not be changed without destroying agricultural production conditions. Second, the

transformer substation and operation management center, non-collector lines shall be managed according to the construction land, and the examination and approval procedures for construction land shall be handled according to law. Third, the field road land can be managed according to rural road land. Fourth, the use of directly buried cables laid collector line land, the implementation of the same management as the project photovoltaic array land. In addition, the Ministry of Land and Resources, the National Energy Administration, the State Council Poverty Alleviation Office *Opinions on Promoting Healthy Development of Land for Photovoltaic Power Generation Industry* requires general photovoltaic project land still need to strictly implement the relevant provisions of the previous.

Generally, in regards to the use of agricultural land, the policy document has moderately relaxed the use control system of “agricultural land for agricultural use” in the current *Land Administration Law*, but tends to adopt the distinction between “permanent basic agricultural land” and “general arable land” within the agricultural land, and at the same time strictly implementing the red line indicators such as the quantity and quality of permanent basic farmland, renewable energy projects can be used in specific situations for general cultivated land other than permanent basic farmland.

### 2.1.5 COMPOUND DEVELOPMENT AND UTILIZATION OF NATURAL RESOURCES UNDER THE INTEGRATION OF ENERGY AND RESOURCE RIGHTS

*Notice on Issues Related to the Use of Forest Land for the Construction of Photovoltaic Power Plants:*

“For forest resources survey identified as forest land and the second national land survey identified as unused land, should adopt ‘ forest and light complementary ‘ land use model, ‘ forest and light complementary ‘ model photovoltaic power station to ensure that the use of forest land does not change the nature of forest land ‘. Using the ‘ forest and light complementary ‘ land use model, the battery module array handles the use of forest land according to the temporary occupation of forest land during the construction period. During the operation period, the two parties can sign a compensation agreement and use the forest land through leasing. “

Article 18 of the *Management Measures of PV Poverty Alleviation Power Station* states, “Encourage PV enterprises to actively fulfill their social responsibility and take a compound approach of agricultural light, pastoral light, and fishery light to support poverty alleviation with market-based revenue”.

## **2.2 INSTITUTIONAL SAMPLES OF RENEWABLE ENERGY PROJECT LAND IN REPRESENTATIVE AREAS**

Ningxia Hui Autonomous Region’s *Notice on the regulation of new energy industry land* Article 4 stipulates:

The autonomous region’s Land and Resources Department shall, in accordance with the relevant provisions of the State and the autonomous region, strictly control the scale of new energy industry land such as photovoltaic power generation, reduce the scope of construction land acquisition and diversion, and only permanent land such as office buildings, booster stations and hardened roads in the plant area will be used for pre-approval of project land. When the project land is pre-approved, only the permanent land such as office buildings, booster stations and hardened roads in the factory area will

be expropriated and converted to state-owned construction land, and the area occupied by the battery array will no longer be converted to construction land. Between the battery components and the array does not change the original land type, not converted to construction land, the project unit can negotiate with the rural collective economic organization or the original land user compensation, to lease or contract the land use rights.

Shandong Province's *Notice on Securing and Regulating the Management of Land for Photovoltaic Power Generation Industry Projects* provides that

for photovoltaic array facilities laid on agricultural land, in the land does not form the actual pressure occupation, does not change the surface form, does not affect the premise of agricultural production, can be determined by the original land type, do not change the land use ... PV compound project substation and operation management center, collection line tower infrastructure land, according to construction land management, according to the law for construction land approval procedures.

Hebei Province's *Measures to Accelerate the High-quality Development of New Energy Industry* requires to strengthen the role of overall planning of land resources by municipalities, incorporate the spatial information of new energy projects into the "one map" of territorial space planning, strictly implement the requirements of zoning control of ecological environment, and guarantee the land and sea demand of new energy industry in the territorial space planning. In regards to the new energy industry demonstration projects listed in the provincial key project construction plan, there are priorities to land use indicators; For new energy industry projects with intensive land use, when determining the low price of land transfer, it can be no

less than 70% of the National Minimum Price Standard for Industrial Land Transfer corresponding to the local land, etc., but it should not be lower than the sum of the actual acquisition cost of the land, the preliminary development cost of the land and the relevant fees to be charged according to the regulations after calculating in proportion. Local governments are encouraged to supply construction land through long-term leasing, leasing and concatenation, combination of leasing and concatenation, and flexible years.

In general, the following consensus understanding has basically emerged in representative regions regarding the institutional model and division of labor positioning for land use for renewable energy projects: First, the application of the expropriation method is restricted by distinguishing circumstances and focusing on the use of private rights negotiation to solve the issue of the rights basis of land use. Second, the scope of conversion of agricultural land to construction land is restricted according to whether the type of land use is changed during project construction.

### **3 THE DIRECTION OF IMPROVING THE LEGAL SYSTEM OF RENEWABLE ENERGY PROJECT LAND**

#### **3.1 APPLICATION OF STRICTLY APPLICABLE COLLECTIVE LAND EXPROPRIATION**

Renewable energy projects that require the use of collective land need to be determined in a comprehensive manner according to the duration and type of land use to determine whether land needs to be supplied through the expropriation system. In particular, the justification of the ends and means and the degree of adaptation should be analyzed according to the principle of proportionality in administrative law. The expropriation system should be used mainly for

permanent land occupation in reservoir inundation areas and hub project construction areas of hydropower projects, permanent land occupation in wind and solar energy management areas, substations, tower foundations and actual occupation of pressure, etc. involving established collective land. In this way, the ownership and use of collectively owned agricultural land and unused land are transformed, and the ownership is changed in the way of “both expropriation and transfer”.

### **3.2 EXPANDING THE SCOPE OF APPLICATION OF PRIVATE RIGHTS MODELS SUCH AS LEASED PROPERTY AND EASEMENT**

First, in addition to the way of obtaining the right to use state-owned and collective construction land by leasing stipulated in the current legislation, it should be combined with the provisions of the *Rural Land Contract Law* on the establishment of land management rights on top of land contract management rights by lease, for the following circumstances: occupy general arable land for renewable energy project development, such as solar energy, wind power plant projects do not occupy the case of pressure, without changing the land tenure, land class provides that the project subject has the right to take the branch lease from the main body of farmers to obtain the right to operate the land. It is necessary to point out that, for an economic consideration of the land use, it is necessary to consider whether there is a situation that causes a decrease in the production capacity of adjacent land for compensation for the loss of damaged rights and interests.

Second, collective land use rights are adopted to provide land for renewable energy project sites, while sharing the development and operation income based on the equity.

Third, explore the way to establish easements for project land use. In terms of policy, the Ministry of Science and Technology, the

Ministry of Industry and Information Technology, the Ministry of Housing and Construction, and the Ministry of Commerce issued the *Opinions on Supporting the Development of New Industries and New Business Patterns to Promote Land for Mass Entrepreneurship and Innovation*, which stipulates that “small supporting facilities for new industries are encouraged to obtain easements for construction in accordance with the law.” The easement system is a kind of legal usufructuary right clearly stipulated in the *Civil Code*. It has the advantages of private rights such as determination of the setting and the negotiation of the consideration. At the same time, compared with the relative defect that the lease right only has the binding effect between the contracting parties of a specific contract, it can constrain all the subjects who actually use the land, and can better ensure the stability and predictability of the project land.

### **3.3 ADJUSTING THE DETAILED CONTROL PLANNING SYSTEM AND THE USE CONTROL SYSTEM TO PROVIDE PLANNING FLEXIBILITY FOR COMPOSITE SITES**

The current detailed control planning and use control system, which is statutory and unique in setting land use, is unable to meet the demand of multi-functional utilization such as “dominant function – subsidiary function” and “composite utilization”. For new industry supporting infrastructure such as new energy vehicle charging facilities, mobile communication base stations, etc., which have small land area and need to be distributed in multiple points, it should be stipulated that land can be provided in the form of allotment. For forest light, agriculture light, animal husbandry light, fishery light and other composite mode of land use, in the case of not violating the use of forest land, grassland and other specific natural resource species and

land type settings, the legislation should allow the use of the agreement to resolve the land and its compensation issues.

### **3.4 REFINE THE LAND COMPENSATION SYSTEM FOR RENEWABLE ENERGY PROJECTS**

The current legislation for renewable energy projects land compensation provisions is too coarse, and needs further refinement and improvement. For example, Article 57 of the *Land Administration Law* stipulates: construction projects and geological surveys require the temporary use of state-owned land or land owned by peasant collectives ...The villagers committee shall sign a contract for the temporary use of land and pay compensation for the temporary use of land as agreed in the contract. At the policy level, Article 6 of the *Opinions on the Implementation of Photovoltaic Power Generation for Poverty Alleviation* provides for a poverty alleviation income distribution management system, which is of reference significance. In its provisions: the city (county) government where each poverty-stricken county is located shall establish a photovoltaic poverty alleviation income distribution management methods, accurate identification of poverty alleviation objects, and dynamic management, in principle, should guarantee that each poverty alleviation object to obtain an annual income of more than 3,000 yuan. Government funds at all levels to support the construction of village-level photovoltaic power station assets belong to the village collective, the village collective to determine the distribution of project revenue, most of the proceeds should be directly allocated to eligible poverty alleviation objects, a small portion can be used as the village collective public welfare funds for poverty alleviation; in the poor households installed on the roof and courtyard of the household photovoltaic system property rights belong to the poor households, all the proceeds to the poor households.

Local government-designated investment and financing entities and commercial investment enterprises joint venture construction of photovoltaic power plants to alleviate poverty, the project assets to the investment and financing entities and investment enterprises in common, the proceeds are divided according to the share ratio, the investment and financing entities to share shares quantified to the poor, on behalf of the poor to participate in the project investment and operation, monthly (or quarterly) to the poor to distribute asset income.

#### **4 CONCLUSION**

The legal system of land for renewable energy projects needs to follow up the reform process of market allocation of land elements and unification of urban and rural construction land markets in China, and make corresponding system design and rule improvement. For the project land that can be classified as public welfare land, land should be supplied through collective land acquisition and state-owned construction land allocation. For project land other than public welfare land, the land supply should be explored in a diversified and remunerative way, such as granting, leasing and a combination of leasing and letting. At the same time, from the perspective of intensive and economical use of land and the provision of land use benefits, the compound land use system arrangement of co-existence of renewable energy project use and other compatible uses should be actively promoted.

巴西的环境税和可再生能源

**TRIBUTAÇÃO AMBIENTAL E ENERGIAS  
RENOVÁVEIS NO BRASIL<sup>18]</sup>**

**ENVIRONMENTAL TAXATION AND RENEWABLE  
ENERGY IN BRAZIL**

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## 摘要

本文论述了环境税作为可再生能源的调节器，有利于保护环境和能源结构的多样化。鉴于可再生能源生产存在的潜在风险可能危及社会经济发展，因此有必要制定一项有效和安全的能源政策。巴西政府鼓励可再生资源的多样性，其丰富的自然资源，将带来巨大的能源红利。因此，多样化和易开发的能源结构将改善巴西的社会和经济环境，提升人们的生活质量，促进了相关产品和服务发展。

**关键词：** 环境税收； 可再生能源； 能源结构

## RESUMO

O presente texto trata da tributação ambiental como promotora de energias renováveis e diversificação da matriz energética em prol da tutela do meio ambiente. Diante de tal finalidade, tem-se presente a necessidade de uma política energética eficiente e segura, em atenção a potencialidade e a exposição aos riscos que podem comprometer a produção de determinadas formas de produção de energia renovável que podem comprometer o desenvolvimento socioeconômico. Cabe ao Estado brasileiro incentivar a diversidade de suas fontes renováveis, privilegiando as suas riquezas de recursos naturais, tornando-as cada vez mais acessíveis à população em todas as suas classes. Resulta que, uma matriz energética segura, diversificada e acessível acarreta melhorias econômicas e sociais à nação, em especial ambientais, mas não só, pois proporciona desenvolvimento e benefício na qualidade de vida das pessoas, promovendo inclusão social e ajustamento de preços na produção e oferta de produtos e serviços.

**Palavras-chave:** Tributação ambiental; Energias renováveis; Matriz energética diversificada.

## ABSTRACT

This text deals with environmental taxation as a promoter of renewable energies and diversification of the energy matrix in favor of protecting the environment. In view of this purpose, there is a need for an efficient and safe energy policy, considering the potential and exposure to risks that may compromise the production of certain forms of renewable energy production that may compromise the socioeconomic development. It is up to the Brazilian State to encourage the diversity of its renewable sources, favoring its wealth of natural resources, making them increasingly accessible to the population in all its classes. Consequently, diversified, and accessible energy matrix brings economic and social improvements to the nation - especially environmental, but not only- as it provides development and benefits in people's quality of life, promoting social inclusion and price adjustment in production and supply of products and services.

**Keywords:** Environmental taxation; Renewable energy; Diversified energy matrix.

## 1 INTRODUCTION

This study aims to analyze how environmental taxation can encourage the generation of electricity through renewable energy sources to improve the efficiency of the Brazilian energy matrix. Therefore, it is important to consider, when dealing with these policies, the potential of energy production and exposure to risks that may

compromise its execution, as well as the costs of its implementation and performance.

Environmental taxation in the electricity sector aims to mitigate the use of energy that originates from the burning of fossil fuels, which is predominant in the country and in the world, however, has a high polluting level.

It is noticeable that, nations tend to change their energy matrix to cleaner forms in pursuit of sustainability and energy efficiency, which is why the focus has turned to renewable energies. Incidentally, this concern gains greater weight in relation to dependence on fossil fuels in terms of the volatility of their prices, which currently, in addition to the consistent environmental attention for being one of the greatest causes of the greenhouse effect, has also had a strong influence on the economy of countries, interfering in high inflation. This situation has gained a better perception since the war between Russia and Ukraine broke out, due to the fact that the former is one of the main oil producers and has been the target of major economic sanctions from different countries and has cut off its supply to the Occident, which in turn has triggered the price increase of different products and services.

At the same time, it is important to consider that the inclusion of renewable sources should not compromise national development policies. It is known that such sources do not have the same energy potential, compared to the polluting source originated by the burning of fossil fuel, and may suffer interference from the climate, which compromises their own production. In turn, this risk also belongs to its producer/investor, who requires prudence in the implementation of measures that may compensate this. In these circumstances, it is verified that the expenses to implement a renewable energy source are high, which gives it a competitive disadvantage and can make it less attractive, causing an impasse in the expansion of its adoption.

In this context, which is inferred from the need to reduce costs, that environmental taxation can encourage the use of renewable energies, so that they present exponentially as an option to encourage the development of technologies with plans of different scales tending to reduce the negative environmental impacts created by carbon emissions.

It is intended to demonstrate in this outline that it is necessary that the Brazilian legal system meets the international recommendations concerned with the preservation of the environment, stimulating the implementation of different energy sources that are clean and bring environmental improvement for all, taking advantage of taxation so that the renewal of the energy matrix is achieved, making it diversified and efficient, so that the country becomes less dependent on polluting sources.

## **2 RENEWABLE ENERGIES AND INCENTIVE POLICIES**

Renewable energies became more appreciated in the last two centuries because of the warning that fossil fuels were finite. One of the factors that influence efforts to implement renewable energies is the fluctuation in fuel prices. It is noteworthy that in the 1980s, witnessing the fall in oil prices, there was a lack of incentive to explore new energy alternatives. (AQUILA, 2015)

With concerns arising from the consequences of climate change from the 1990s onwards, the UN held important conferences in order to alert nations to the urgency of thinking about solutions to socio-environmental problems, which concentrated on proposals for changes in the energy matrix with the introduction of renewable energies, since climate change mitigation issues are connected to it. It must be highlighted the following meetings and actions that brought relevant debates and documents on measures to face climate change:

Rio 92, Rio +10 and Rio +20, as well as Agenda 21 and the Paris Agreement, in 2015; Brazil made a commitment.

Brazil integrates, almost in its entirety, the multilateral agreements on the environment, although the internalization of these is awfully slow. Even in this slow way, for a long time the country showed itself in a prominent position in environmental protection, such as, in the past, the fight against deforestation associated with the international perspective of the Amazon Forest and hosting two United Nations Conferences (Rio 92 and Rio +20) on the environment and sustainable development.

Already, the government of Jair Messias Bolsonaro, from 2019 to 2022, manifested a liberal agenda in the economy and economic growth aimed at the exploitation of natural resources and agribusiness. The said President, still in 2018, in his election campaign, made a promise to withdraw Brazil from the Paris Agreement, when he was elected. Jair Bolsonaro's allegations were that the Agreement interferes with the nation's sovereignty over the Amazon Rainforest. (SANCHES, 2019)

At the time of his election, President Jair Bolsonaro, even though he did not believe in global warming as a real problem, had to review his position because his demonstration against the Agreement did not have a positive impact on the international front, raising the risk of rejection of Brazilian agribusiness products in the international market. Needing, therefore, to review his position on leaving the Paris Agreement, even though the fires in the Amazon were highlighted in the media. (SANCHES, 2019)

Even though the government preferred to invest in extractive and polluting economic policies, Brazil is committed to the climate through the Paris Agreement, with assumed goals, especially on renewable energies. The main objective of the document is to restrain the global increase in temperature.

The country, when signing the Paris Convention (COP 21) in December 2015, invoked goals before the United Nations Framework Convention on climate change (UNFCCC), with the granting of the Intended Nationally Determined Contribution (INDC). With the cited document, several obligations were assumed by Brazil. Regarding renewable energies, it can be specified as follows:

- i) aumentar a participação de bioenergia sustentável na matriz energética brasileira para aproximadamente 18% até 2030, expandindo o consumo de biocombustíveis, aumentando a oferta de etanol, inclusive por meio do aumento da parcela de biocombustíveis avançados (segunda geração), e aumentando a parcela de biodiesel na mistura do diesel;
- (...) iii) no setor da energia, alcançar uma participação estimada de 45% de energias renováveis na composição da matriz energética em 2030, incluindo:
  - expandir o uso de fontes renováveis, além da energia hídrica, na matriz total de energia para uma participação de 28% a 33% até 2030.
  - expandir o uso doméstico de fontes de energia não fóssil, aumentando a parcela de energias renováveis (além da energia hídrica) no fornecimento de energia elétrica para ao menos 23% até 2030, inclusive pelo aumento da participação de eólica, biomassa e solar;
  - alcançar 10% de ganhos de eficiência no setor elétrico até 2030.
- (...) v) no setor industrial, promover novos padrões de tecnologias limpas e ampliar medidas de eficiência energética e de infraestrutura de baixo carbono; (INDC, 2015)

Such commitments have international prominence and have been endorsed by 195 countries. Europe, even though it stands out in terms of the rise of renewable energies, it should be noted that, in recent times, has faced a crisis in its energy matrix due to problems caused by the climate and, therefore, becoming increasingly dependent

fuel imports. For this reason, it reinforces the importance that the energy matrix should be diversified so that there is less damage to its efficiency. The European Union stands out in the promotion of renewable energies, however, with the increase in electricity demand due to the resumption of the post-pandemic economy and affected by external and geopolitical factors, the European renewable matrix is not able to sufficiently accommodate its demand, causing it to rely on oil imports, mainly Russian, which is responsible for a third of the continent's supply. (CHAVES, 2021)

In Brazil, Law 12,187/09, which deals with the National Policy on Climate Change, had vetoed the guidelines for reducing the use of fossil fuels and their replacement in the energy matrix. It may seem that the Brazilian government was against sustainability measures in favor of the environment in the energy sector, which in fact were not privileged at the time of the veto. However, the exclusion of these measures would be justified by the possibility of weakening the reliability and security of the system. In addition, the Brazilian territory has relevant sources of oil and coal to promote an adequate energy yield, which brings economic benefits to the country. (FIORILLO; FERREIRA, 2020).

Organizing new sources of energy that are renewable is something imperative and of global necessity, however, it is necessary to observe its implications and the risk of energy crisis in the face of its uncertainties. It is not intended to argue that this justifies not investing in renewable sources, on the contrary, since they, unlike oil, which must be considered as an exhaustible source, are environmentally desirable, and should therefore be encouraged. In this way, it is necessary to encourage instruments that allow the lowest possible degradation, so that fossil fuels are used rationally, and so that there are investments in technologies for the diversity of renewable sources in the energy

matrices, making them efficient, clean, and sustainable options accessible to the population.

The main source of electric energy in Brazil is hydraulic production, although it has a strong potential to explore other renewable sources, such as wind, solar and biomass. Brazil has elements to make its energy matrix diversified which can help in national energy security, however, it takes long steps to increase sustainable energy generation.

The energy potential of a hydroelectric plant, in its normality, is considered high. It so happens that this type of production suffers from climatic effects. This was evident from mid-2021 to early 2022, when it was essential to activate thermoelectric plants in Brazil, due to the water shortage witnessed in this period. This led to an increase in energy prices, as well as a change in the tariff flag.

In the world, the percentage of energy produced by hydroelectric plants reaches 20%. (TERRIN; BLANCHET, 2019) While in Brazil, this type of generation in the internal supply is more than half of the Brazilian energy matrix (65.2%). (EPE, 2021) The Brazilian energy matrix is considered renewable, and this great representativeness is due to the production of energy in hydroelectric plants, followed to a lesser extent by the production of wind and solar energy.

Hydraulic electricity generation is reputed to be a clean source. But it is not entirely safe considering that it is conditioned to the climate, and its water flow varies according to the density of the rains. Furthermore, according to studies, the creation of a hydroelectric plant has repercussions on environmental damage, flooding large areas and altering ecosystems, devastating vegetation, silting up rivers and annihilating species, not to mention the displacement of riverside populations. And once installed, it causes impacts on the environment, including the possibility of emitting gases that are harmful to the environment, such as methane and carbon dioxide, which are released by the decomposition of submerged vegetation. (FEARNSIDE, 2019)

Furthermore, environmental losses are aggravated in the event of a water crisis that involves the reduction in the flow of hydroelectric reservoirs, which compromises the essential practice of the riverside population, such as fishing and river transport.

As exposed, the Brazilian energy matrix can be rich from the possibility of the diversity of sources that can be used. Another means of producing electricity that is available is the supply through biomass that originates in sugar cane plants. In 2020, the percentage of supply from this source reached 9.1%. (EPE, 2021). It is a less expensive form of generation than burning fuels, which can reach half the cost of the latter. (FORBES, 2021)

Biomass comes from organic matter and is considered the first source used by humanity, being used to cook food through the heat of combustion. Some of the derivatives of biomass are bio-oil, biogas, biomass-to-liquid, cellulosic ethanol, bioethanol, biodiesel, firewood, charcoal, and peat. Among the experiences with biomass, in 1975 there was Proalcool, a program for the development of ethanol as a substitute for gasoline. At the time, it had world prominence in the commercial exploitation of biomass as an energy source. In the 1980s, Brazil became less dependent on importing fossil fuels, however, the government's financial difficulties and the drop in the price of crude oil on the international market, meant that support for the ethanol industry began to decline. Brazil has a relevant capacity to produce energy from biomass, mainly because it has a large area of planted sugarcane. (AQUILA, 2015)

Another source that Brazil has implemented is wind energy. It can be introduced in various locations and scales, and can be onshore (on land), as well as offshore (seacoast), as well as small or large wind farms. It has been one of the sources that has advanced. Europe has the best use of this source, accompanied by China and the United States. As for the latter, incentive programs and investment funds have

boosted the production of electricity using this type of production source. In Brazil, an attempt was made to encourage this source through the Emergency Wind Energy Program (PROEÖLICA), during the energy crisis in 2001, and this Program did not generate meaningful results and resulted in its replacement by the Alternative Sources Incentive Program (PROINFA). The places with the most wind potential in the Brazilian territory are the coastal regions of the Northeast and the South. (AQUILA, 2015)

PROINFA, created by Law 10,438/2002, later adjusted by Law 10,762, in November 2003 and by Decree 5025, in March 2004, established obligations for electric energy concessionaires to participate in the universalization of access to it, for the increase in the share of electricity from independent undertakings. In this program, financing systems by the National Development Bank (BNDES) and requirements for the participation of national equipment in contracted projects were included. The Program was proposed at an opportune moment “o cenário internacional, de apoio à energia limpa e as preocupações relacionadas com o protocolo de Quioto teve um papel importante na elaboração e aprovação do PROINFA” (AQUILA, 2015, p. 82).

In turn, solar energy is considered the most abundant because it comes from the sun’s rays and can be classified as passive and active, thermal, or photovoltaic, concentrated or non-concentrated. Although it has a small global supply of electricity, it technically has the potential to vastly exceed world energy demand. The main obstacle to its deployment is the cost of its technology. (AQUILA, 2015)

In addition to these, new sources of renewable energy are being analyzed and are presented as alternatives, such as geothermal, bioenergy and wave and tidal energy, which demonstrates the need for continuous stimulation of innovation, fulfilling the responsibility of

the public power to keep an eye opened on the different alternatives for improving the energy matrix.

### **3 ENVIRONMENTAL TAXATION AS A STRATEGY TO PROMOTE RENEWABLE ENERGY SOURCES**

The importance of the environment for human life is undeniable, which should not be limited to theoretical discussions and the preparation of works warning about the exploitation of natural resources at a pace that does not accompany their renewal, environmental protection measures must be implemented by States and individuals requiring economic and regulatory interventions.

Faced with the global concern about climate change, different governments have been more attentive to the development of measures to reduce greenhouse gas emissions. Many have generated policies to promote renewable energies. Intervention by government administrations can be long-term or short-term, with the latter ending with the strategy, and the former continuing until the end of the policy implementation. Some common forms of short-term strategy are direct subsidies, tax cuts for renewable source projects or tax requirements starting from a certain level of carbon dioxide emissions. While the long-term ones would be, for example, the price and quota systems. (AQUILA, 2015)

It is a multidisciplinary and interdisciplinary issue to associate the environmental issue with energy, not to mention the economic and social issues that the theme involves in the face of other guidelines that can be raised according to the format in which the renewable source is implemented and regulated.

Just to clarify, energy raises debates in various aspects, such as:

Na contextura jurídica a energia é um bem juridicamente tutelado como uma questão de interesse público. Possui reflexos importantes nas mais variadas ordens.

Na Economia, a energia aparece como um elemento externo ao sistema econômico, que deve ser levado em consideração a partir de uma relação entre custo e oportunidades. Já em um sentido político, pode-se dizer que a energia é uma condição do desenvolvimento. Ela possibilita que a sociedade crie e mantenha mecanismos de adaptação ao meio ambiente natural através do aquecimento, do arrefecimento, da alimentação dos meios de transporte e motores industriais, além da própria comunicação da sociedade.

Importante apontar que a inclusão social pressupõe, portanto, acesso universal à energia. Somente com energia se pode participar comunicativamente da sociedade contemporânea, quer dizer, uma sociedade que transcende os espaços das interações presenciais face-a-face. Sua falta corresponderia a uma catástrofe social. Os sistemas sociais deixariam de funcionar, a economia quebraria, a segurança se encerraria, a saúde pública será afetada, o direito já não se aplica mais, a política perde seus meios de vinculação generalizada de suas decisões e etc.

[...] A questão energética colocada para o direito não está mais apenas nas relações entre produção, transmissão, distribuição e consumo de energia. Agora a energia tem que ser pensada também como um recurso natural escasso que coloca como problema a própria continuidade operativa da sociedade como um todo; um produto cuja utilização não pode agravar a situação ecológica do planeta; bem como diante de seus significativos impactos na esfera social.

[...] Atualmente – e especialmente após a descentralização do sistema de geração, transmissão, distribuição e consumo de energia –, a energia só pode ser juridicamente entendida como dependente da tecnologia e dos recursos naturais. Essa tríplice referência jurídica, ecológica e

tecnológica permite pensar em princípios específicos ao Direito da Energia: o princípio da segurança no abastecimento energético, da eficiência energética, do não-retrocesso na utilização de tecnologias, do acesso universal à rede de distribuição de energia e, por fim, o princípio da liberdade energética (TERRIN; BLANCHET, 2019, p. 49, 50)

From the Brazilian perspective, there is a consistent absence of incentives for renewable energies other than hydroelectric production. Dependence on this modality to a high degree, has already been verified, even in 2022 with the drought, it was necessary to activate thermoelectric plants, which does not guarantee a safe energy matrix. What is important is that the Brazilian system ensures an energy matrix that is not only sustainable, but also efficient. It matters, in view of the reality that was found in Europe, also in 2022, in view of the war and limitation in the supply of oil, as well as considering the inconstancy in the provision of some renewable sources due to external conditions often caused by climate variations, that the energy matrix is diversified, so that it is efficient in its supply, economic and sustainability aspect.

As an instrument to promote renewable sources to become competitive and attractive, environmental taxation appears as an option. The Brazilian legal system, at the constitutional level, has not specifically related tax law to the environment, although there is no prohibition. However, this understanding can be extracted from device 170, VI, and 225, caput, both of the Federal Constitution, which configure the intention of conforming the economy and the environment, since it is possible to consider the tribute as an economic instrument. That is, environmental taxation can be a mechanism to protect the environment in the economic order.

Environmental taxation is an effective instrument to ensure fundamental rights, which requires an incentive policy to guarantee

legal certainty to agents who invest in favor of the environment. Electricity is essential, almost all activities, from leisure to economic, involve its consumption. Failure and insecurity in the energy supply reflect in the most different stances, hence the relevance of its discussion and the need to diversify its sources and facilitate its access.

Environmental taxation can be represented by its extra fiscal nature of inducing behaviors that are most desired for the protection of the environment. Such conduct would be driven by the tax burden, so that the tax burden would be increased to discourage and reduced or even extinguished to encourage a certain conduct. It would attribute differentiated tax treatment motivated by the environmental protection supported by the Federal Constitution. (BASSO, 2010)

In the same sense is the OECD's Taxing Energy Use report, which guides nations to analyze fiscal options for the use of taxation on energy to induce investment in renewable sources. The document states that taxes influence energy prices to contain negative impacts and that incentives would be alternatives for clean technologies. According to the OECD, taxing polluting sources would reposition demand for renewable sources. It would be a way to discourage behavior. (OECD, 2015)

In this last point, which is suggested by the OECD, it should be noted that considering attributing a higher tax burden on polluting energy in Brazil is complex. Energy taxation is already high, and its price is unreasonable, and it is an element that has repercussions on different production and consumption chains. To make a renewable source competitive, it is necessary to consider its energy potential, its efficiency and make it accessible to the final consumer. The latter, the consumer, needs to be considered in energy policies, since he is the one who uses and pays for the energy, he is the one at the end of the economic chain. It should be noted that environmental taxation

is about changing postures so that there is an effective benefit to the environment and no longer a justification for raising more revenue.

Financial stimuli are needed to continuously improve renewable sources, supporting innovative technologies. However, it should be noted that these incentives must guide a renewable energy market, boosting the market, without forgetting to also incite interest and facilitate access to the final consumer. In this sense, Aquila (2015, p. 51) quoted Çetin and Egrican's reflection in Turkey:

Nesse sentido, Çetin e Egrican (2011) citam o exemplo da Turquia, que possui um grande potencial para o aproveitamento de energia solar, mas sem a formulação de estratégias para o desenvolvimento do uso dessa fonte, o país dificilmente conseguirá se tornar um bom exemplo de sucesso nesse setor. Para isso, é necessária a formulação de uma política energética para aumentar a demanda por energia proveniente dessa fonte.

The use of economic instruments for the promotion of renewable energies is demanded, allowing a different treatment regarding benefits and tax incentives in favor of the environment. The tax burden rates on energy in Brazil, although appreciated as an essential good, are high. There is a disincentive that goes against the promotion of renewable sources.

Even if one considers the production of energy by renewable hydroelectric plants, there is a very large disproportion of internal supply among the other energy sources in Brazil, as verified in the National Energy Balance, based on year 2020, organized by the Energy Research Company, in its report 2021: Biomass 9.1%, Wind 8.8%, Solar 1.6%, Coal 3.1%, Natural Gas 8.3%, Oil Derivatives 1.6%, Nuclear 2.2% and Hydraulics 65 ,two%. (EPE, 2021).

It should be remembered that, as seen above, Brazil proposed, in the Paris Agreement, to obtain 45% of renewable energy from its total energy production and to expand the use of renewable sources beyond hydroelectric energy, reaching a percentage between 28 % and 33% in the total production result by the year 2030. Likewise, it committed itself to expanding the domestic use of renewable energy sources that are not hydroelectric or derived from fossil materials, in the supply of electricity, to at least 23% until 2030, especially due to the increase in wind, biomass and solar sources.

The northeast region of Brazil has the highest degrees of global solar irradiation and the lowest variation during the year compared to all geographic regions, which privileges the country to a favorable evolution in the renewable energy matrix in this modality. (MOREIRA JUNIOR E SOUZA, 2020) Solar energy deserves better attention because it uses an inexhaustible source and does not need a large installation area, nor the devastation of vegetation. Photovoltaic cells also rely on modern disposal techniques that do not harm the environment, and the main thing is that they do not emit any polluting greenhouse gases. Considering the environmental benefits, it makes sense for it to have a differentiated treatment to make it competitive and be able to stimulate it. In this sense, it is important to use economic instruments so that barriers and costs for the implementation of this form of energy generation are reduced to increase its benefit.

The State has the role of developing public policies, especially on environmental protection. The environment is related to fundamental rights and sustainable development, and when it comes to the energy matrix, its progress, making it increasingly efficient and clean, can promote them. When it comes to these four elements, we are talking about improving the quality of life and well-being of all. One cannot create impasses to energy production because it will negatively affect economic growth, on the other hand, the activity cannot annihilate the

environment, compromising people's health. A rational and balanced assessment of all this is required, with the need to conform the environment and the economy to achieve sustainable development.

The taxes and charges that fall on electricity end up being borne by Brazilian consumers, being included in the electricity tariff, ranging from 38%, with the remaining 62% being the cost of generation, transmission, and distribution of electricity. Not to mention the value and taxation levied on equipment from renewable sources that, likewise, will be considered in your offer. Tax costs are high, which highlights the need to implement fiscal policies that promote renewable energies to make them competitive. However, such incentives cannot be considered privileges and must be under cost-benefit control and justified by the protection of the environment.

## **4 CONCLUSION**

Despite verifying the relevance and constitutional orientation of the State to conduct environmental protection, to have a rational balance between the environment and the economy, it was emphasized that Brazil does not use a consistent state policy to encourage clean energies that are different from energy produced by hydroelectric sources. It is important to design a model for the promotion of renewable energies with specific tax incentives to balance the costs between the sources of electrical energy, making those conceptualized as renewables, competitive and attractive, as well as accessible to consumers.

The State, in addition to sanctioning, can also be the driver of behavior. It is up to him to manage the protection of the environment, prioritizing measures that present the lowest possible social cost. For this reason, the country needs to direct efforts to improve its energy

matrix, not prioritizing only hydroelectric plants and considering that water is also a finite asset, plus relying on a hydraulic source also jeopardizes its energy efficiency.

It is up to the country to encourage the diversity of its renewable sources, favoring its wealth of resources that help it to achieve this end. A safe, diversified, and accessible energy matrix brings economic and social benefits, the latter including environmental benefits, providing development and improvement in people's quality of life, which promotes social inclusion and price adjustment in the production and supply of products and services, helping to contain inflation.

Given the above reasons and the international documents signed by Brazil, there is the nation's commitment to introduce renewable technologies and mitigate the environmental impact. Therefore, it is important that public policies are implemented so that there is greater sharing of clean energy, making its production and consumption accessible. And, as seen, environmental taxation can function as a promoter of the increment of renewable technologies, attributing incentives regarding the acquisition of equipment to the reduction of taxes that affect the consumption of clean energy.

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绿色税制对中国可再生能源产业发展的影响

**O EFEITO DO SISTEMA DE TRIBUTAÇÃO VERDE NO  
DESENVOLVIMENTO DA INDÚSTRIA DE ENERGIAS  
RENOVÁVEIS NA CHINA**

**THE EFFECT OF GREEN TAX SYSTEM ON THE DEVELOPMENT  
OF RENEWABLE ENERGY INDUSTRY IN CHINA**

李鹤 (He Li)  
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## 摘要

可再生能源产业是国民经济的重要组成部分，是改善生态环境质量、实现绿色低碳发展的重要途径。税收不仅是国家获取收入的一种形式，也是充分支持可再生能源产业和促进可再生能源发展的一种方式。中国通过设立环境保护税和资源税，有效地提高了传统化石燃料生产商和消费者的税收负担。此外，中国在其他税收制度中也对可再生能源利用项目采取了许多税收优惠措施，如增值税、企业所得税、消费税、车船税，降低了企业投资可再生能源的资金成本，对可再生能源的发展形成了良好的促进作用。

**关键词：** 可再生能源； 税环境保护税； 资源税； 税收优惠

## RESUMO

A indústria de energias renováveis é uma parte essencial da economia nacional e uma forma significativa de melhorar a qualidade do meio ambiente e alcançar o desenvolvimento verde e de baixa emissão de carbono. A taxação não é apenas um recurso de geração de receita estatal, mas também um meio de apoiar integralmente a indústria de energias renováveis e promover o seu desenvolvimento. A China tem efetivamente aumentado o encargo tributário em produtores de combustíveis fósseis tradicionais e consumidores através do estabelecimento de proteção ambiental e tributos sobre recursos naturais. Ademais, a China também adota muitos incentivos tributários para projetos de utilização de energias renováveis em outros sistemas tributários, como o tributo de valor acrescido, imposto de renda de pessoas jurídicas, tributos sobre consumo e tributos sobre veículos e navios, os quais reduzem os custos de capital para empreendimentos

investirem em energias renováveis e criar uma boa promoção para estes investimentos.

**Palavras-chave:** Energias renováveis; Taxação; Tributo de proteção ambiental; Tributo sobre recursos naturais; Incentivos tributários.

## ABSTRACT

The renewable energy industry is an essential part of the national economy and a meaningful way to improve the quality of the ecological environment and achieve green and low-carbon development. Taxation is not only a form of national revenue acquisition but also a way to fully support the renewable energy industry and promote renewable energy development. China has effectively raised the tax burden on traditional fossil fuel producers and consumers by establishing environmental protection and resource taxes. In addition, China also adopts many tax incentives for renewable energy utilization projects in other tax systems, such as value-added tax, corporate income tax, consumption tax, and vehicle and vessel tax, which reduce the capital cost for enterprises to invest in renewable energy and form a good promotion for the development of renewable energy.

**Keywords:** Renewable energy; Taxation; Environmental protection tax; Resource tax; Tax incentives.

## 1 INTRODUCTION

Currently, energy security and environmental protection are common concerns for all countries worldwide. As fossil fuels such as

coal and oil are limited, the world needs renewable energy sources such as wind, solar, hydro, biomass, geothermal, and ocean energy. Plants and systems that use renewable energy sources produce energy environmentally and healthily as they do not emit greenhouse gases or pollutants. Renewable energy development has become an important strategic choice for China to optimize energy structure and cope with climate change.<sup>①</sup> As such, China enacted the Renewable Energy Law in 2005, listing the development and utilization of renewable energy as a priority area for energy development and promoting the establishment and development of renewable energy markets. In recent years, China has committed to the world to “strive to achieve carbon peaking by 2030 and carbon neutrality by 2060” and is further vigorously developing renewable energy. However, the primary way to develop and utilize renewable energy is to convert it into electricity. Moreover, compared to traditional fossil energy, renewable energy has a high cost in converting electricity, which means price competitiveness is a weak disadvantage. Only by reducing the development cost of renewable energy can we improve the comparative efficiency of renewable energy development and utilization, as well as continuously improve the competitiveness of renewable energy in the energy market with non-renewable energy.

In order to promote the development and utilization of renewable energy, China has utilized many instruments, including fiscal, taxation, price, finance, and planning instruments. Among them, taxation means adjusting the relevant tax elements of energy, especially renewable energy development and utilization, through the formulation and improvement of the legal taxation system to reduce the comparative cost of renewable energy development and utilization in the whole energy development and utilization, enhancing its competitiveness. For example, for the investment of renewable resources, the government encourages social enterprises to invest in renewable resources through a series of measures such as tax rate reduction, investment credit,

tax holidays, etc. The effective price of renewable resources assets of enterprises can be controlled, which reduces the capital cost and forms a good promotion effect on enterprises to invest in renewable resources.<sup>②</sup>At the same time, taxation also affects the consumption of non-renewable resources. If the government raises the tax rate of the non-renewable resource industry by eliminating tax incentives and adding new taxes, it will lead to a sharp increase in cost of producing or using non-renewable resources. According to the laws of the market and the theory of the quantity-price relationship, if the price of non-renewable energy products increases, it will lead to a decrease in the actual demand of consumers, which will have a restraining effect on the consumption of non-renewable fossil energy. China has permanently attached great importance to taxation's critical role in promoting renewable energy development. Compared with fiscal, financial and planning instruments, the tax system has a more essential statutory and stable nature, making it easier to form clear and definite market players' expectations and promote the formation of a market mechanism conducive to renewable energy development and utilization.

## **2 ENVIRONMENTAL PROTECTION TAX AND THE DEVELOPMENT OF RENEWABLE ENERGY**

Since the sewage charging system was established in 1979, sewage charges have played an important role in preventing and controlling environmental pollution in China. In order to meet the urgent requirement of domestic environmental quality improvement and the reform trend of the national taxation system of clearing fees and changing taxes, China enacted the Environmental Protection Tax Law, which was implemented on January 1, 2018. The Environmental Protection Tax Law stipulates that the taxpayers of environmental protection tax are enterprises, institutions and other production operators that directly discharge taxable pollutants

into the environment and other sea areas under the jurisdiction of the People's Republic of China. Environmental protection tax is mainly levied on specific acts of polluting and damaging the environment, and the objects of taxation are divided into four categories, including air pollutants, water pollutants, solid waste and noise. Moreover, according to the relevant provisions of the Environmental Protection Tax Law, the provincial governments set the tax amounts for air and water pollutants in their regions taking into account the regional environmental carrying capacity, the current situation of pollutant emissions and the requirements of economic and social-ecological development goals, as well as giving full play to the tax leverage to guide enterprises. Data released by China's Ministry of Ecology and Environment shows that since the introduction of the environmental protection tax in 2018, the country has enjoyed a total of more than 10 billion yuan in tax breaks for low-standard emissions of pollutants.

**Table 1:** Table of environmental protection tax items.

<b>Tax item</b>	<b>Tax unit</b>	<b>Tax amount (RMB)</b>
Air pollutant	per pollution equivalent	1.2-12 Yuan
Water pollutant	per pollution equivalent	1.4-14 Yuan
Solid waste		
Coal gangue	per ton	5 Yuan
Tailings	per ton	15 Yuan
Hazardous waste	per ton	1000 Yuan

Tax item	Tax unit	Tax amount (RMB)
Smelting slag, fly ash, slag, other solid waste (including simi-solid, liquid waste)	per ton	25 Yuan

### (I) Control of air pollutants

Environmental pollutants and greenhouse gas emissions in China are highly homogenous. Nearly all sources of Sulfur Dioxide (SO<sub>2</sub>) and Nitrogen Oxide and Nitrogen Dioxide (NO<sub>x</sub>) emissions are associated with anthropogenic activities, about 50% of VOCs emission sources and about 85% of primary PM<sub>2.5</sub> emission sources (excluding dust sources) in China are highly congruent with Carbon Dioxide (CO<sub>2</sub>) emission sources. Therefore, the reduction of pollutant emissions by means of taxation can force the adjustment of energy structure, which will be able to promote the development of renewable energy and build a green industrial chain and value chain system. Since the implementation of the environmental protection tax system, the tax burden for enterprises, especially some industries with high emissions of air pollutants, such as the non-ferrous metal industry, papermaking and recycled plastic granulation will be higher than in the past. China's emissions of NO<sub>x</sub> are among the highest in the world, resulting in serious air pollution, acid rain problems and huge economic losses.

According to the relevant provisions of the Environmental Protection Tax Law, each province and city in China sets the tax amount for air pollutants in the region, taking into consideration the regional environmental carrying capacity, the current situation of pollutant emissions and the requirements of economic and social-ecological development goals, so that the tax policy can be fully effective. For example, Beijing stipulates that the upper limit in tax collected in Beijing is 12 RMB per unit of pollution; Shanghai stipulates

that the tax rates for NO<sub>x</sub> are RMB 6.65 per unit of pollution and RMB 7.6 per unit of pollution, respectively in 2018, while the tax rates for NO<sub>x</sub> are increased to RMB 7.6/ per unit of pollution and RMB 8.55 per unit of pollution respectively since 2019. The high tax rates imposed on air pollutants in various regions have prompted companies to continuously use renewable energy sources to reduce the potential tax burden associated with air pollutants. For example, the Huaneng Huangtai Power Plant in Jinan, Shandong Province, China, has adopted new technologies to vigorously improve the unit's thermal energy utilization efficiency, heating capacity, and in the case of the project of energy storage power plant to be completed in 2021 alone, to effectively improve the efficiency of renewable energy utilization and save 16,900 tons of standard coal annually. The plant will pay environmental protection tax of RMB 4.77 million in 2020; and RMB 3.77 million in 2021 under the Environmental Protection Tax Act.

## **(II) Control of solid waste**

China's energy consumption has been dominated by coal for a long time. According to the BP World Energy Statistics Yearbook (2022), in 2021, China's coal consumption was 86.17 Exajoules (EJ), accounting for 53.8% of the total global consumption. Coal combustion not only produces a large number of greenhouse gases and other air pollutants, but its production and consumption process produces gangue, fly ash, slag and other solid waste. The disposal process of these byproducts will also generate secondary pollutants. For example, the internal temperature in gangue stacks can reach temperatures that can cause spontaneous combustion, releasing additional large amounts of SO<sub>2</sub>, H<sub>2</sub>S, NO<sub>x</sub> and other harmful gases, aggravating the total amount of greenhouse gas emissions.

For this reason, China's Environmental Protection Tax Law taxes the solid waste generated during the production and use of coal at a high tax rate. Using renewable resources to replace coal will result in a lower tax burden, thus providing a reverse incentive for companies to transform their energy mix. For example, China Shenhua Energy Corporation, the world's leading coal-based integrated energy company, has been accelerating its new energy business since 2022. The company has signed agreements with local governments to participate in the development and construction of new energy projects such as photovoltaic, wind power and geothermal energy while contributing 4 billion yuan to set up a new energy industry investment fund (the overall size of the fund is 10.02 billion yuan, which will mainly be invested in new energy projects such as wind power and PV).

As per the Chinese Environmental Protection Tax Law, the environmental protection tax shall be levied at a reduced rate of 75% if the concentration value of taxable air pollutants or water pollutants is less than 30% of the national or local emission standards. If the concentration value of taxable air pollutants or water pollutants discharged by the taxpayer is less than 50% of the national and local emission standards for pollutants, the environmental protection tax shall be levied at a reduced rate of 50%. Considering that higher pollutant emissions would increase the amount of tax, the introduction of the environmental protection tax would benefit companies that use renewable energy sources to enjoy the tax benefits from the government. Taking Qinghai Province as an example, with 1,340 environmental protection tax taxpayers in the province, 179 enterprises that improved clean energy enjoyed environmental protection tax relief, and the amount of relief was RMB 64.71 million with the introduction of environmental protection tax. Therefore, implementing the Environmental Protection Tax Law effectively promoted the development of renewable energy in the province.

### **3 RESOURCE TAX AND THE DEVELOPMENT OF RENEWABLE ENERGY**

As one of the essential material bases for social and economic development, energy and mineral resources play an increasingly important role in the economic development of a country. China's coal resource consumption currently accounts for about 50% of the global total. Although the share of coal in primary energy has decreased from about 67% in 2013 to less than 56% in 2021, it is still much higher than the global average value of 27%. The consumption of large amounts of coal resources is also a fundamental reason for the high emissions of air pollutants. Therefore, making full use of China's abundant renewable energy resources such as scenery, and gradually reducing the consumption of fossil energy, especially coal, is a strategic direction that needs to be adhered to in the long run. In this process, a sound resource tax system can serve as a powerful tool to accelerate the transformation of economic development and promote the reduction of carbon emissions. <sup>③</sup>Resource tax is a tax levied on various taxable natural resources to reflect the reimbursable use of state-owned resources and regulate the income of resource grade difference. In order to adapt to the national conditions at different stages of development and the needs for economic growth, China has made a series of adjustments to the resource tax system and gradually improved and established the existing framework of the resource tax system.

#### **(I) Increasing the resource tax rate on traditional energy resources**

The original Provisional Regulations on Resource Tax stipulated that resource tax was levied on crude oil, natural gas, coal and other minerals and was calculated on an ad valorem basis. Since 2004, China

has started to raise the resource tax rates on crude oil and natural gas nationwide. Among them, the resource tax amount of crude oil and natural gas in some oil fields has reached the highest standard stipulated in the regulations, i.e., 30 RMB/ton and 15 RMB/thousand cubic meters, which makes the enterprises' tax burden too heavy to increase production costs. Therefore, enterprises have to make a shift to using clean energy, which, in its turn, is conducive to achieving energy conservation and reducing carbon emissions.<sup>④</sup> In 2014, the applicable tax rate of resource tax for crude oil and natural gas was increased from 5% to 6%, according to the relevant policy. This policy raised the resource tax on coal in order to achieve the purpose of controlling the consumption of fossil energy and thus accelerate the construction of renewable energy such as wind power.

## **(II) Introduction of the Resource Tax Law**

The Law of the People's Republic of China on Resource Tax shall come into effect from September 1, 2020. The taxable amount of resource tax shall be calculated by multiplying the sales of taxable products by the proportional tax rate applied by the taxpayer or by multiplying the sales quantity of taxable products by the fixed tax rate applied by the taxpayer following the method of ad valorem rate or quantitative rate. In particular, China's taxation method for energy and mineral resources has changed from "taxation according to quantity" to "taxation according to price". "Taxation according to quantity" is the object of taxation by quantity, while "taxation according to price" is the object of taxation by price. After the taxation is directly linked with the price of resources, the more scarce the resources are, the more expensive they are, and the environmental cost of using them will increase accordingly: when the price of resources rises, and the efficiency of enterprises improves, the taxation will increase

accordingly, which is conducive to promoting resource conservation and encouraging enterprises to develop renewable resources.

In addition, the energy minerals included in the object of taxation of the Resource Tax Law are mainly fossil energy minerals, such as crude oil, natural gas and coal. Therefore, the levy of resource tax is a significant expense for enterprises consuming fossil energy, which leads to a decrease in their market competitiveness. In contrast, the primary renewable energy sources such as wind, solar and hydro energy are not targeted for taxation and are not subject to resource tax. Therefore, enterprises using renewable energy will reduce their resource tax burden by a significant amount, thus effectively reducing their production costs. This effectively curbs the momentum of the rapid growth of fossil energy extraction,<sup>⑤</sup> effectively increasing the proportion of new energy, especially renewable energy.

**Table 2:** Table of resource tax items and tax rates

<b>Tax item</b>	<b>Tax object</b>	<b>Tax rate</b>
Crude oil	Crude oil	6%
Natural gas, shale gas, natural gas hydrate	Raw ore	6%
Coal	Raw ore or beneficiated ore	2%-10%
Coal-forming (seam) gas	Raw ore	1%-2%
Uranium, thorium	Raw ore	4%
Oil shale, oil sands, natural bitumen, rock coal	Raw ore or beneficiated ore	1%-4%

Tax item	Tax object	Tax rate
Geothermal	Raw ore	1%-20% or 1-30YUAN per cubic meter

#### 4 OTHER TAXES AND THE DEVELOPMENT OF RENEWABLE ENERGY

In addition to environmental protection tax and resource tax, China also reduces the tax burden of renewable energy enterprises from VAT, enterprise income tax, consumption tax and vehicle and vessel tax, thus effectively reducing the production cost of renewable energy. Compared with 10 years ago, the average cost per kilowatt for onshore wind power projects in China has dropped by about 30%, and for photovoltaic power projects by about 75%. They are as low as RMB0.214/kWh, RMB0.433/kWh and RMB0.170/kWh, respectively.

##### Value Added Tax (VAT)

VAT is a transfer tax levied on the value added to goods (including taxable labor services) in the process of circulation as the basis for taxation and is levied on the added value or the value added to goods at multiple stages in the production, circulation and labor services of goods. The current VAT system in China is based on the relevant regulations promulgated on December 13, 1993, and many of the tax incentives in its implementation have contributed to the development of renewable resources. For example, “added tax levied immediately returned” is a kind of tax preference in which the tax authorities partially or fully refund the tax paid according to the tax law; and “paying value-add tax before drawback” is a kind of tax

preference in which the tax authorities partially or fully refund the tax paid according to the tax law. Furthermore, “tax before drawback”: the tax is firstly levied according to the relevant provisions of VAT in the period when the goods are declared for export and financially sold by the production enterprise, and then the enterprise will declare to the competent tax authority for tax refund according to the provisions of the national export tax refund policy every month with the relevant tax refund documents.

In 2001, the State issued the regulations on VAT policy issues for products with comprehensive utilization of resources, half reduced the VAT on electricity produced by wind power and added tax levied immediately returned. Different forms of VAT preferential policies were implemented for some hydroelectric power generation, wind power generation and photovoltaic power generation projects: for county-level and below county-level Small hydroelectric power generation units selling self-produced electricity (small hydroelectric power generation units refer to small hydroelectric power generation units with an installed capacity of 50,000 kilowatts or less (including 50,000 kilowatts) built by various types of investment entities) may choose to pay VAT according to the simplified method per the levy rate of 6%. In 2015, the State Taxation Administration issued a policy on VAT on wind power generation, which, starting from July 1, 2015, The State Administration of Taxation (SAT) issued a policy on VAT on wind power, which stipulates that since July 1, 2015, taxpayers are entitled to a 50% refund of VAT on sales of self-produced electricity products produced by wind power. For example, China Three Gorges Corporation opened its first offshore wind power company in Northeast China, and its largest offshore wind power project is located in Zhuanghe City, Liaoning Province. The project is eligible for the preferential policy of a “50% VAT refund on the sale

of self-produced electricity products produced by wind power”, with an average annual VAT reduction of about 34 million RMB.

In 2007, according to the state’s notice on import tax policy, high-power wind turbine equipment (single rated power of not less than 1.2 MW) is large, clean, and efficient. In 2007, according to the State Circular on Import Taxation Policy, high-power wind turbine equipment (single machine rated power not less than 1.2 MW) belongs to large clean and high-efficiency power generation equipment and is included in the 16 critical areas of major technical equipment determined by the State Council. Since June 2010, domestic enterprises that meet the prescribed conditions for the production of large-scale environmental protection and comprehensive utilization of resources to support the development of equipment must import some of the key components and raw materials, which can be exempt from the import of VAT.

## **(II) Enterprise Income Tax**

Enterprise income tax is an income tax levied on the production and operation income and other income of enterprises and other income-generating organizations in China. The Enterprise Income Tax Law of the People’s Republic of China was implemented on March 16, 2007, and many of the tax incentives in its implementation have also been instrumental in promoting the development of renewable resources.

In order to encourage foreign-invested enterprises to engage in energy infrastructure projects, China decided that for renewable energy projects invested by foreign-invested enterprises before the end of 2007, if the income is foreign-invested enterprises engaged in electricity production and operation, then the corporate income tax will be paid at a reduced rate of 15% until the year 2007. If the new renewable energy power project is after 2008, different preferential

measures will be applied according to the number of years. Among them, for 1-3 years, the renewable energy enterprise income tax is exempted; for 4-6 years, the renewable energy enterprise income tax is reduced by half. At the same time, China encourages the development of renewable energy projects in the western region, which can enjoy a 15% corporate income tax benefit, but only if the renewable energy business income accounts for not less than 70% of the total revenue of the enterprise. In addition, the relevant authorities have provided the following benefits for high-tech industries engaged in the research and development of renewable energy technologies: High Technology Corporation enjoys a 15% reduction in corporate income tax when paying corporate income tax for funds invested in renewable energy technology research and development.

### **(III) Consumption tax**

Consumption tax is a collective name for various taxes levied on the turnover of consumer goods by the government. China issued the regulations related to a consumption tax on December 13, 1993, in which the tax on environment-related consumer goods can effectively control energy consumption and promote energy structure transformation. According to the law, consumption tax is levied on gasoline and diesel at RMB 0.2/liter, and RMB 0.1/liter, respectively, and differential tax rates are applied to small cars according to their exhaust volume. On April 1, 2006, China began to implement a newly adjusted consumption tax policy, which includes naphtha, lubricating oil, solvent oil, aviation kerosene, fuel oil and other refined products into the scope of consumption tax collection. At the same time, according to the new Chinese national automobile classification standards, small cars are divided into two categories: passenger cars and light and medium commercial buses; six tax rates of 3%, 5%, 9%,

12%, 15% and 20% are applied to passenger cars according to their exhaust volume, and a uniform tax rate of 5% is applied to light and medium commercial buses. This will further reflect the concept that more emissions will result in more tax and fewer emissions will result in less tax, and effectively promote the production and consumption of energy-saving vehicles.

#### **(IV) Vehicle tax**

The vehicle and boat tax is a tax levied on the owners or managers of vehicles and boats (from now on referred to as vehicles and boats) with vehicles and boats as the characteristic objects. Vehicle and Boat Tax Law of the People's Republic of China" has been implemented since January 1, 2012, and the amount of tax is executed in accordance with Vehicle Tax items. 2012 and 2015, China has twice clarified the preferential policy on energy conservation and the use of new energy vehicles and boats. On August 1, 2018, China issued a notice on the preferential policy of vehicle tax for energy-saving and new energy vehicles and vessels, requiring exemption of vehicle tax for new energy vehicles and vessels that meet the standards and a 50% reduction of vehicle tax for energy-saving vehicles that meet the standards. The preferential vehicle and vessel tax policy has pushed consumers to shift from the traditional car market to the new energy car market. According to statistics, in June 2021, China sold 1.575 million vehicles, of which 223,000 were new energy vehicles, accounting for 14.16% of the total.

## **5 CONCLUSION**

China's tax legal system and related tax policies have played a positive role in promoting the development of renewable energy

care. According to the latest data from China's National Energy Administration, by the end of June 2022, China's installed renewable energy power generation capacity reached 1.118 billion kilowatts, and renewable energy generation capacity reached 1.25 trillion kilowatt hours. Among them, the utilization rate of water energy in major basins nationwide was about 98.6%, 0.2 percentage points higher than the same period in 2021; the average utilization rate of wind power nationwide was 95.8%, and the average utilization rate of photovoltaic power was 97.7%. The average utilization rate of hydropower was 1,691 hours, an increase of 195 hours year on year.

As China's tax system and policy implementation increase, companies engaged in the energy-saving and environmental protection industry will have more development opportunities, thus promoting the increasing number of innovative and energy-saving enterprises and the development of renewable energy and other industries. In the future, China can further introduce a taxation system of Carbon Tax, which will help improve the green tax system and solve the problem that environmental protection tax and resource tax cannot directly cover carbon emissions. However, at the same time, the carbon tax levy may also have possible impacts on China's economy and society, and a comprehensive and systematic study of related issues must be conducted before introducing the carbon tax.

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流转税对新可再生能源征税的可行性问题：  
批判性分析、考虑和观点

**A QUESTÃO DA VIABILIDADE DE TRIBUTAÇÃO DAS NOVAS  
FONTES DE ENERGIA RENOVÁVEIS PELO ICMS: ANÁLISE  
CRÍTICA, PONDERAÇÕES E PERSPECTIVAS**

**THE QUESTION OF THE VIABILITY OF TAXING NEW  
RENEWABLE ENERGY SOURCES BY ICMS: CRITICAL ANALYSIS,  
CONSIDERATIONS AND PERSPECTIVES**

Waldemar de Albuquerque Aranha Neto (瓦尔德马尔·内图)

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## 摘要

本文讨论了ICMS对新的可再生能源（主要是风能和太阳能）征税的问题。目前的模式是规定将征税额度分配给消费者所在的州（或联邦区）。鉴于新税收来源的扩大，设备所在地的政府对这种制度设计提出了质疑，重点是东北地区。现有两种方案，第一种方案通过增加税收额度来解决问题，第二种方案通过全部或部分取代现有税收制度来解决问题。因此，本文辩证地分析每种方案的优劣，面对各种现实情况，分析得出了结论，提出一揽子解决方案，例如收取特许权使用费。

**关键词：** ICMS； 可再生能源； 税收分享； 特许权使用费

## RESUMO

O presente artigo aborda a temática da tributação pelo ICMS das novas fontes de energias renováveis, principalmente, as matrizes eólica e solar. O modelo atual prevê a atribuição do produto arrecadado para o Estado (ou Distrito Federal) onde esteja localizada a unidade consumidora. Tendo em vista a expansão das novas fontes, o desenho institucional vem sendo questionado pelas entidades federadas nas quais estão sediadas as unidades geradoras, com destaque para a Região Nordeste. Duas vias são postas para debate: a primeira alternativa propõe a solução do problema pela majoração da carga tributária e a segunda alternativa pelo deslocamento, no todo ou em parte, da arrecadação já existente. A fim de compreender o nível de sua viabilidade, os pontos favoráveis e desfavoráveis de cada caminho são comparados dialeticamente. A análise resulta numa postura crítica, em face das várias ponderações que se mostram necessárias, apontando

para a necessidade de consideração paralela de outras perspectivas, a exemplo da cobrança de royalties.

**Palavras-chave:** ICMS. Novas fontes de energia renováveis. Partilha tributária. Royalties.

## ABSTRACT

This article addresses the issue of taxation by ICMS on the new sources of renewable energy, mainly wind and solar power. The current model provides for the allocation of the collected product to the State (or Federal District) where the consumer unit is located. In view of the expansion of new sources, this institutional design has been questioned by the federated entities in which the generating units are based, with emphasis on the Northeast Region. Two paths are up for debate: the first alternative proposes a solution to the problem by increasing the tax burden and the second alternative by displacing, in whole or in part, the existing sum. To understand the level of its viability, the favorable and unfavorable points of each path are dialectically compared. The analysis results in a critical stance, in face of the various considerations necessary, pointing to the need for parallel consideration of other perspectives, such as the collection of royalties.

**Keywords:** ICMS. New sources of renewable energy. Tax sharing. Royalties.

## 1 INTRODUCTION

This article addresses the relationship between new sources of renewable energy and the incidence of ICMS. More specifically, it deals with the possibility of modifying the model currently used for taxation of the mentioned electrical matrices, with emphasis on wind and solar origin.

The current institutional design for the collection of this tax places the State (or Federal District) where the electricity consumer unit is located as the destination of the collected product. In recent years, with the introduction and expansion of new renewable sources, the format described has been questioned by the federated entities in which the generating units are headquartered. The Northeast Region presents itself as a relevant actor in this matter, due to its outstanding natural potential for the installation of wind and solar farms.

To a large extent, the demand is based on the legitimacy that the federated entities would have to partake in the wealth generated with the economic exploitation that took place in their territories and, also, on the need to mobilize resources to deal with the impacts arising from that activity, that is, to equate externalities, including those of an environmental and social nature.

The claim for receipt of tax revenues is under debate in two ways: the *first alternative* is the adoption of a higher charge that would be levied on new renewable sources, to meet the demand of federated entities; the *second alternative* would correspond to a displacement, in whole or in part, of the currently existing taxation, in order to contemplate the same purpose. However, to evaluate the suggested paths, it is important to work on questions, such as the following: what are the favorable and unfavorable points for the formation of a political consensus for the approval of the measures? Would it be possible to

foresee legal objections, which could motivate judicial control over the proposed changes in the institutional model?

Therefore, there is still no definition of the direction that will be taken, and it is necessary to deepen the studies that strengthen this debate, particularly due to the relevant impact that any measure has the potential to represent, whether in the fiscal-budgetary area, or in what regards the economic and social effects.

To achieve these goals, the development of this work was divided into three parts.

In the second section, there will be an exhibition and contextualization of the questions addressed to the current institutional design, which allocates the collected product to the State (or Federal District) where the consumer unit is located.

The third section begins with an exposition of the alternatives for changes in the taxation of new renewable energy sources by ICMS. To estimate its viability, each proposal will have its favorable and unfavorable points listed, so that they can be compared dialectically.

In the fourth section, the analysis will take on a critical stance, in face of the many intrinsic considerations that are pertinent to them, suggesting the opening for the concomitant search for other perspectives.

## **2 ICMS ON ELECTRIC ENERGY: QUESTIONING THE MODEL**

Amid other controversies related to the taxation of new renewable energy sources by ICMS - (DA SILVA; CAPELHUCHNIK, 2022); (MACEDO; FONTE; CHAVES in CAVALCANTE; FREITAS; CALIENDO, 2020) and (RUBIM; FABRI in CAVALCANTE; FREITAS; CALIENDO, 2020) -, the definition of the destination of the funds collected has been questioned, at least in terms of new

renewable sources on the rise, mainly wind and solar (GONDIM; SANTOS, 2014) and (SANTOS, 2021b). To a large extent, the debate is based on the fact that the Municipalities and States where such generating units are located end up without being able to count on revenues related to the ICMS levied on this economic activity. There are several arguments to support this proposition, however, the most frequent are linked to the legitimacy of participating in the wealth generated in its territory and, also, to the need to deal with the impacts arising from the implementation and operation of wind and solar farms.

Regarding the first argument, it is possible to visualize its foundation on the principle of contributory capacity, described in article 145, §1, of the Federal Constitution. More specifically, it is worth noting that the demand would be based on the objective aspect of that postulate, because, according to Paulo de Barros Carvalho: “[...] Realizar o princípio pré-jurídico da capacidade contributiva absoluta ou objetiva retrata a eleição, pela autoridade legislativa competente, de fatos que ostentem signos de riqueza.” (2008, p. 207). The exploration of the economic activity of electric energy generation would be, in this prism, the event that denotes a sign of sufficient wealth to justify the tax collection.

The second argument is based on a strategy that goes back to the so-called Pigouvian Tax, a nomenclature made famous by the studies of Arthur Cecil Pigou (1932 [1920], p. 192). In this case, it is assumed that the market price does not reflect the social cost of the respective activity, due to the negative externalities that were not incorporated in the formation of that value, this conclusion follows the argument originally presented by Alfred Marshall when he, among other topics, discussed the beneficial effects – positive externalities – that education provided for the general well-being of society (1920 [1890], book IV, p. 170–182). In terms of externalities, the most commonly considered is the environmental one, that is, the repercussion that the activity in

question causes to the environment, but the concept is also applicable to effects perceived in other spheres of society.

### **3 THE VIABILITY OF THE ALTERNATIVES UNDER DEBATE: ANALYSIS OF SCENARIOS FROM THE OPTICS OF CONSENSUS AND DISSENT**

The *first alternative* is the possibility of increasing ICMS taxation. Based on this strategy, a higher aliquot or an additional aliquot would be used to affect the sale of electricity, when it comes from new renewable sources, so that the collected product would be destined to the State (or Federal District) where the generating unit is located.

The present measure presents some points favorable to its viability.

First, it would respond to the request of the federated entity, on the basis of making it partake in the wealth generated in its territory, giving effect to the objective aspect of the principle of contributory capacity. On the other hand, it would fulfill the role of pigouvian, to incorporate the social cost of externalities into the market price and, thus, meet the economic efficiency guideline. In addition, it would tend not to suffer political resistance from any taxing entity, as it does not reduce revenue for any of them.

However, despite the items highlighted above, there are others that counterpoint them.

In the wake of doctrinal questions (SAMPAIO, 2021), the Federal Supreme Court, on December 18, 2021, judged the merits of Extraordinary Appeal n. 714.139/SC, in which Theme 745 was being debated, concerning the criterion of applicability of the selectivity technique, within the scope of ICMS. The decision was aimed at establishing the thesis that, if the aforementioned technique was adopted, it would constitute a violation of the Federal Constitution to use aliquot on “[...] electricity and telecommunication services

at a level higher than that of operations in general, considering the essentiality of goods and services.” (STF, 2021).

Among other reasons, but also as a result of the position of that court, the Complementary Law n. 194, of June 23, 2022, which, besides other measures, inserted article 18-A in Ordinary Law n. 5,172, of October 25, 1966 (CTN), and also article 32-A in Complementary Law n. 87, of September 13, 1996. In both interventions, the intention is to consider electric energy as an essential good, that cannot be taxed at a higher level than other operations subject to the tax.

From the above, some consequences are drawn.

It would not be legally feasible to increase the aliquot or create an additional aliquot for the commercialization of electricity from new renewable sources using an amendment to the infra-constitutional legislation, because the basis of the thesis established by the STF in Theme 745 is the intelligence of article 155 , §2, III, of the Federal Constitution. It means to say that a Constitutional Amendment would be necessary to fulfill this purpose. However, even if such a measure was proposed, it would possibly be the subject of political and legal enquiry.

As it happens most of the electricity is acquired in the regulated environment and this characteristic means that the tariff paid by the captive consumer is composed of all the costs and expenses involved in the production and commercialization process, with no room for negotiation. Therefore, if such ICMS collection is instituted, its value would end up being passed on to the price, not only because this is the methodology of an indirect tax, but also because of the guarantee of the economic-financial balance of the concession contracts, as provided for in article 2, §8,V, of Ordinary Law no. 9,427, of December 23, 1996.

Even in the free contracting environment - where the hypothesis of the generating unit reducing its profit margin could be raised, in order to absorb a certain share of the impact resulting from the

new charge and, thus, pass it on only partially -, the eventual sharing of the financial burden of the tax between seller and buyer would tend to point to a greater proportion in the transfer to the acquirer, considering that electricity, as an essential good, has low elasticity in the demand curve (MANKIW, 1999, p. 92).

In any case, therefore, the new cost would be passed on, whole or in part, and, in addition, the same would be felt more strongly in the lower income classes, causing restriction of access to electric energy and affronting the objective of universalization, pursuant to article 3, XII, of Ordinary Law no. 9,427, of December 23, 1996.

It is also worth mentioning that the application of selectivity, in order to increase taxation by ICMS, would not only have the consequence of having repercussions on goods considered essential, but would also have a different kind of inconvenience.

The increase in the tax burden would change the structure of incentives to which economic agents are subject, leading to the conclusion that the Public Power would be adopting a measure of disincentive to the consumption of electricity from new renewable sources. In other words, such matrices that, compared to others, have less relevant impacts, would be discouraged from use, due to the increase in their acquisition cost.

This issue is very relevant because, from the economic point of view, new renewable sources are still less efficient than large hydroelectric plants, which means that the context of encouraging diversification is still present. It is worth noting that many studies point to the need to maintain - and even expand - the structure of incentives for new renewable sources, namely: (BRITO, 2014); (CASTELLO, 2015); (CAVALCANTE; FREITAS; CALIENDO in CAVALCANTE; FREITAS; CALIENDO, 2020); (OLIVEIRA; MONT'ALVERNE in CAVALCANTE; FREITAS; CALIENDO, 2020); (RAMOS FILHO; LEÃO in CAVALCANTE; FREITAS; CALIENDO, 2020);

(RIBEIRO in CAVALCANTE; FREITAS; CALIENDO, 2020); (ROLIM; FONSECA; CRYSTAL in CAVALCANTE; FREITAS; CALIENDO, 2020); (SANTOS; SANTOS in CAVALCANTE; FREITAS; CALIENDO, 2020) e (SANTOS, 2021a).

The scenario described above would make it difficult to form the political consensus necessary for the approval of a Constitutional Amendment, but, it would open the door to the possibility of legal discussion about violation of the stony clause (article 60, §4, IV, of the Federal Constitution). Regarding this last aspect, among other possible developments, it would be plausible to point out an affront to the principle of human dignity, considering that the realization of this postulate demands the guarantee of the right to life and property (article 5, caput, of the Federal Constitution), both affected by the restriction on access to electricity, especially in the lower income brackets.

To get around this issue, it would be necessary to build some system to minimize or cancel this impact, especially in the case of the low-income population. In this context, it is possible to think about the expansion of the existing state subsidy in the Electric Energy Social Tariff, regulated by Ordinary Law n. 12,212, of January 20, 2010; which could be progressively reduced, depending on the efficiency gains from new renewable sources. This proposal does not resolve all the nuances of the question raised, but it could contribute to the resolution of the problem.

The *second alternative* would be to change the institutional design to allow charging by the State (or Federal District) where the generating unit of the new renewable sources is located. This displacement of the collected product could be full or partial.

The first point to note is that this measure would not imply an increase in the tax burden, therefore, it would not have the consequence

of raising the cost of electricity and, thus, would not suffer from several of the objections discussed above. This item favors its viability.

On the other hand, the new design would require the approval of a Constitutional Amendment, since the decision on the destination of ICMS collection on electricity operations was taken in the rules originating from the Major Law. Evidently, it is plausible to foresee political resistance to the change because this would imply a reduction in revenues for some federated entities.

Each interested party would have to measure the gains and losses with the new proposal in order to position themselves in face of the change. It would even be necessary to raise alternative scenarios, for instance, fully shifting the amount collected to the location where the generating unit is established or adopting some level of sharing between both interested. However, despite the need for calculations, it is reasonable to infer that there would be a tendency to favor the Northeast Region, due to its wind and solar potential.

Referring to the data available in the ONS (2022), we can see a correlation in the behavior of two variables: the geographical distribution of electricity generation versus the distribution by electrical matrix. In 2000, when wind and solar sources were insignificant and hydraulics corresponded to 94.1% (ninety-four integers and ten tenths percent), the Northeast Region represented 13.9% (thirteen integers and nine tenths percent) of the entire generation in the country. In 2020, when the hydraulic source had reduced its share to 71.1% (seventy one integers and ten tenths percent) and wind and solar sources added up to 10.8% (ten integers and eight tenths percent), the Northeast Region passed representing 17.9% (seventeen integers and nine percent). So, not only would there be an initial impact with the institutional redesign, but it would also be possible to project an increase in this difference in subsequent years, if the same logic is

maintained in the conditions of expansion of generation capacity, something that appears to be quite plausible.

A similar measure was adopted at the time of approval of Constitutional Amendment n. 87, of April 16, 2015, when ICMS on interstate sales to final consumers started to be shared between the State of origin and the State of destination. Previously, the tax was collected in full by the State of origin. The rule had been elaborated at a time when this type of operation was uncommon (generally, it depended on a telephone call), but, with the development of electronic commerce, the market share subject to this new practice became very relevant, having repercussions on an increasing concentration of collection in the Southeast Region.

In the case of new sources of renewable energy, there was a similar movement, that is, the scenario quite concentrated and based on the hydraulic matrix has been modified, giving rise to the questions about the possibility of sharing the ICMS or even displacing it in full to the federated entity where the generating unit is located. The precedent of Constitutional Amendment n. 87, of April 16, 2015, becomes an argument to contribute towards the viability of political consensus for the present alternative, however, there are other points to consider.

The first refers to externalities. If, on the one hand, the State (or Federal District) where the generating unit is located would have revenues to deal with the effects of the exploitation of natural resources in its territory, on the other hand, the fact that the level of taxation remains constant would not allow the formation of market prices to signal that circumstance. On the other hand,, the *second alternative* only redistributes the same tax burden, so the amount of resources available to deal with externalities does not result from the inclusion of this social cost in the price practiced by the market and this circumstance makes the decision inefficient, under the economic prism.

Another issue refers to the foundation linked to the objective aspect of the principle of contributory capacity, in this case, the claim for participation in the wealth generated in their territories. By making the State (or Federal District) where the generating unit is located collect resources as ICMS, this demand would be met. Within this debate, it would be necessary to discuss which amount of the collected product would adequately fulfill this purpose, if in whole or in part. However, what in principle can be seen as a positive point in favor of its political viability, also has the potential to generate dissent.

As proposed, the change in the institutional design would be applicable only to new renewable sources, mainly wind and solar, but the measure could create an opening for the same argument to be used in the case of other matrices, including non-renewable ones. Questions would be formulated, such as: if the federated entities where wind farms and solar farms are located have the legitimate right to participate in the wealth generated in their territories from the exploitation of their natural resources, wouldn't other entities that shelter sources from other matrices also have the same right? Or, to put in another way: why would only wind and solar sources generate for their federated entities the legitimate right to share in the wealth resulting from the exploitation of their natural resources? Wouldn't the other matrices also represent the private economic exploitation of a natural resource in their territories, supporting the legitimate claim for a share in the wealth generated? Would this not correspond to discriminatory treatment between the federated entities, which would imply a violation of the principle of isonomy?

In other words, the discussion that took place at the time of the National Constituent Assembly, when deliberating on who would be the active subject of the collection, would come to the forefront again, after the Union agreed to transfer taxation on electricity trading operations to the States and the Federal District.

It is worth mentioning that, for the purposes of this *second alternative*, it would not make sense to think about applying it to the sources of all matrices. Because, as already seen above, there is still a considerably concentrated profile, mainly in large hydroelectric plants, so, if the displacement of the collected product was not specifically applicable only to new renewable sources, the federated entities that today plead for the change, in the final balance, would end up losing ICMS resources. Thus, to be able to work for the purpose, the rule would have to be punctual, and this characteristic would open room for another discussion: the accusation of casuistry.

See, for example, the comparison with what happened for the approval of the aforementioned Constitutional Amendment n. 87, of April 16, 2015.

At that time, the scenario was of concentration of ICMS in the federated entity where the seller of the goods purchased by a consumer domiciled in another State was located. The amendment promoted a sharing between the two taxing entities interested in the event, however, supposed that the proposal was to apply this strategy to only two types of goods, in this context, the probability of reaching the political consensus necessary for the approval of a change in the constitutional text would be much smaller. It is possible to consider the objection that the measure would violate the principle of tax equality (article 150, II, of the Federal Constitution), from the perspective of generating units, which would be treated differently depending on the electrical matrix they use. In other words, casuistry would be a means of affronting the aforementioned principle and this argument would most likely come to light if the change in the ICMS allocation criterion was proposed only for new renewable sources.

## 4 CONCLUSION

From the picture described, despite some favorable points, many circumstances present a challenging panorama for the two alternatives under debate, which makes their political and legal viability very difficult and, thus, induces the concomitant search for other perspectives.

One of the possible measures to deal with the issue refers to the institution of charging royalties for the use of wind and solar sources, as has already been done in the case of the hydraulic matrix. As is known, the Federal Constitution considers this potential as an asset of the Union (article 20, VIII), giving rise to payment for its economic exploitation (article 20, §1), however, such provision does not exist for the case of wind farms and solar farms, but there are news of a proposal presented to the National Congress for their institution (AGORARN, 2021); (JORNAL DO COMÉRCIO, 2018) and (PORTAL SOLAR, 2019).

This *third alternative* would deserve a specific study to verify its viability, however, it is possible to carry out a preliminary analysis to compare it with the other two worked on in this research.

The first point to highlight is in the sense that the institution of royalties would configure a new charge, therefore, it would not resemble the *second alternative* discussed above, thus, does not share its positive or negative points. So, the comparison must be made in relation to the *first alternative*.

Logically, the points favorable and unfavorable to the viability of the *first alternative* would also be present in the discussion of the proposal for the institution of royalties, but there are some peculiarities that may favor this measure, in relation to the increase in ICMS.

As already stated, at the time of approval of the Federal Constitution, wind and solar sources were inexpressive, so there was no reason for them to come to be included as assets of the Union and,

consequently, there was no provision for the collection of royalties. However, the panorama of the productive arrangement has changed and this change, by covering new electrical matrices, offers a scenario that can contribute to the viability of this strategy, compared to the use of ICMS.

The non-collection of royalties is, perhaps, the only factor that unbalances the production of electric energy, when comparing hydraulic sources, on the one hand, and wind and solar, on the other (in fact, the collection of royalties occurs in the exploration of mineral resources, such as coal, gas and oil, which are also used as non-renewable sources). If electricity is considered an essential good, regardless of the matrix from which it was derived, and knowing that there is a charge in other sources, it is entirely plausible that there is also in the case of wind farms and solar farms.

In other words, we want to argue the following: even if the financial amount to be collected turns out to be the same, the ICMS use strategy has the effect of being automatically interpreted as an increase, while the institution of royalties has a reasonable potential to be read as a correction for equalization, meeting the principle of isonomy of treatment between the generating units and, by unfolding, contributing to give effect to the principle of free competition (article 170, IV, of the Federal Constitution). This would even rule out the accusation of casuistry.

Evidently, there would still be an increase in the cost of generation, which would be passed on, in whole or in part, to the consumer unit. This point remains challenging, but in addition to counting on the mitigation that was exposed above, there is still another circumstance that favors the use of royalties, in relation to ICMS: it is possible to graduate the value of royalties to be instituted on new renewable sources in a comparative perspective in relation to the other matrices.

If this *third alternative* is instituted, the comparison at the time of acquisition of electric energy would be made between the values of royalties charged in the different electric matrices, then, it would be convenient and opportune to institute lower values for the new renewable sources, to strengthen the effect of them being read as more attractive. This point would help to alleviate that objection about the State act being, within the framework of incentives, a discouragement to new sources of renewable energy. In the case of ICMS, this effect could never be achieved, because the comparison would inevitably be made with the tax levied on energy generated from other sources, causing the immediate effect of interpretation of an increase.

The graduation at a lower value in the case of new renewable sources would also have the support of another motivation: the pigouvian function. As wind and solar generation cause a lower level of externalities, the amount charged must reflect this circumstance. The two main grounds for charging royalties for the private exploitation of a public good are: the exclusion, limitation, or reduction of utility that this activity imposes on other citizens, that is, externalities, including environmental and social ones; and the legitimate right that the holder has to participate in the economic result of the exploitation of the activity that is carried out with the transfer of his asset. It is worth mentioning that article 20, §1, of the Federal Constitution explicitly mentions such grounds when using the expressions “financial compensation for this exploitation” and “sharing in the result of the exploitation”.

The use of winds and sunlight implies little or no impediment for other people to do similar exploration. In the case of the wind farm, there is a greater possibility of interference by third parties, but even so, it would be at a lower level, when compared to the hydraulic source, albeit small. Thus, in defining the amount to be charged, even if the share corresponding to profit sharing can be calculated at the

same level as other matrices, the other part, which would be supported based on externalities, would be comparatively smaller.

Finally, another point to consider refers to the sharing of royalties. Currently, they are collected by the Federal Government, which transfers part of the amount to the State (or Federal District) and to the Municipality, in which the exploration of the activity is located. As mentioned in the previous section, the corresponding share in the ICMS distribution for the Municipality where wind farms and solar farms are installed tends to enhance, due to the increase in added value, being more significant in small cities. However, that adverse effect that implied a reduction in the quotas owed to other municipalities would not occur in the case of royalties, because the amount collected would result from a new levying. Also, at this point it is possible to glimpse a comparative advantage of the *third alternative*.

Finally, it is not being stated, in a definitive tone, that the path to be followed is the institution of royalties, only a comparison was made between this strategy and the two alternatives put under debate, within the scope of ICMS. The issue demands further investigation, not only to be able to criticize the various arguments presented here, but also to investigate the factors that could not be captured in the present study.

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环境不公与风能生产：  
巴西案例

**INJUSTIÇA AMBIENTAL E A PRODUÇÃO DE ENERGIA:  
O CASO BRASILEIRO<sup>[19]</sup>**

**ENVIRONMENTAL INJUSTICE AND WIND ENERGY PRODUCTION:  
THE BRAZILIAN CASE**

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## 摘要

在巴西，风能的生产在其他能源中脱颖而出，投资规模逐步扩大。然而，确给安装风电场的农业地区带来了一些社会和环境影响。本文围绕对“清洁能源”理念的限制和生态影响，根据巴西经验，探讨风能通过租赁合同影响土地使用，并导致环境不公正现象的成因。

**关键词：**环境不公正；环境处置；租赁合同

## RESUMO

No Brasil a produção de energia eólica tem se destacado no conjunto das demais fontes de energia. O avanço pode ser visualizado nos investimentos aportados no setor. Esse avanço, no entanto, vem deixando vários impactos sociais e ambientais sobre as comunidades rurais onde os empreendimentos eólicos são instalados, denunciando os limites e narrativas ecológicas que circundam a ideia de “energia limpa”. No presente texto procuramos discorrer como, na experiência brasileira, estão expressos elementos de injustiça ambiental mobilizados pela monocultura dos ventos e uma tendência moderna de esbulho de terras, via contratos de arrendamento.

**Palavras-chave:** Injustiça. Meio ambiente. Esbulho. Contrato.

## ABSTRACT

In Brazil, the production of wind energy has stood out among other energy sources. The progress can be seen in the investments

made in the sector. This advance, however, has left several social and environmental impacts on rural communities where wind farms are installed, denouncing the limits and ecological narratives that surround the idea of “clean energy.” In this text, we try to discuss how, in the Brazilian experience, elements of environmental injustice are expressed mobilized by the monoculture of winds and a modern trend of land dispossession, via lease contracts.

**Keywords:** Injustice. Environment. Dispossession. Contract.

## **1 WHAT INJUSTICE DO WIND ENERGY COMPANIES PRACTICE?**

A vast literature on “clean and renewable” energy has been produced in Brazil and in the world denouncing the impacts of wind energy production, in the hegemonic model in which it has been produced. The main ones affected by the euphoria provoked by the wind market are rural communities located in mountain regions. In the Brazilian case, there are also records of many fishing populations, such as Ceará and Rio Grande do Norte, where their lives are impacted by the arrival of wind farms.

The defense of a sustainable development model has been the background from which the exploitation of winds emerges as a non-polluting source of energy, propagated as a producer of benefits and with less environmental impact. Stamp with so many qualities, the production of wind energy would be situated as the technical answer to the environmental problems of which capitalism has been seeking to respond, without thereby questioning the social bases of inequalities and exploitation of natural resources that found the system itself.

This can be seen when the response to the problem falls outside the problem that should be solved. In other words, the search for energy alternatives to the model centered on fossil fuels, or hydroelectric projects, tends not to question the production and consumption engine of many contemporary societies. Otherwise, they ratify a system where environmental and social exploitation takes place without concern for the physical limits of the planet and without constraints regarding the precariousness of human life.

What has been verified in this strategy is, in practice, the obstacle to any idea of sustainability, if we even consider the already questionable concept of sustainable development when considering sustainability supported by the tripod: nature, society and economy. This is because the impacts on local communities and populations, and those that affect nature, call into question the speeches and advertisements published in reports, almost always paid for, by companies in the sector, seeking to demonstrate, above all, the contribution of wind energy to avoiding the emission of tons of carbon dioxide (CO<sub>2</sub>).

Within the scope of the call for initiatives around concrete actions, aimed at mitigating climate change, policies and investments for energy transition based on a “sustainable, renewable and clean” model have received great attention from the market and governments, without neglecting the very inclination and enthusiasm of an environmentalist type of movement. This enthusiasm seems to minimize the many environmental and social impacts produced by the exploitation of wind forces, because by judging their intrusion into nature and communities as “minor,” in comparison with other energy sources, it tends to downplay its short- and long-term effects. Therefore, for Vasconcellos (2016), the forms of appropriation of natural resources reveal how wild and predatory capitalism can show itself, converted from green capitalism as a mystification incapable of overcoming the environmental crisis.

In this sense, when we consider the entry into territories and the type of more direct contact with local populations, conducted by technicians from the projects, we can understand environmental injustice as that practiced by wind energy companies. For Herculano, environmental injustice is:

[...] o mecanismo pelo qual sociedades desiguais destinam a maior carga dos danos ambientais do desenvolvimento a grupos sociais de trabalhadores, populações de baixa renda, grupos raciais discriminados, populações marginalizadas e mais vulneráveis (HERCULANO, 2002:01).

The context for the incursion of companies in the territories is the most favorable to them: a) a large part of the population is illiterate or semi-literate; b) there are communities that have financial fragilities due to the environmental conditions to which agricultural activity is subjected; c) their territories are on the margins of public policies and social assistance; d) its rural population is aging (ABRAMOVAY and CAMARANO, 1998). Given this scenario, the arrival of enterprises offering permanent income, work, new roads and better living conditions for these populations means that, at first, the presence of wind turbines is presented as a hope for the unfavorable conditions in which some people live in rural communities.

Despite these conditions, it should be urged that life in the countryside, for many of these populations, represents a way of life in which proximity to nature produces amenities in relation to the difficulties of everyday life, in addition to providing related identities and belongings, the history of the community itself. This leads to bonds of solidarity found, under certain conditions, only in the forms of socialization provided by the community inter-knowledge, relationships built by the interactions of life in the countryside.

Furthermore, the rural environment, considering the local amenities, can represent quality aging in view of the psychological aspects related to the well-being of the elderly living in the countryside, with family support, infrastructure and health care available. However, what is witnessed in many of the experiences of setting up wind farms is the psychic illness (depression, headaches, loss of sleep, etc.) produced by the daily noise of wind turbines. In this sense, the presence of wind complexes in communities has contributed to making the aging of affected populations even more problematic.

As can be seen, after the first moment of seduction of the community, the second is characterized by the social and environmental impacts that make hope for better days a true nightmare. From then on, with the process of installing the towers, the presence of people outside the territory, the prohibitions on land use, the limitations imposed on the population in relation to circulation in some areas, the constant renovation of houses, in order to repair cracks and the constant noise, reveal why wind energy cannot be considered a clean source.

What can be intuited about the social and environmental impacts of wind energy production is: if they are not the causes of many of the difficulties present in rural communities, they tend to be an amplifier of them. When not, the very origin of misfortune, as is the case with the noise caused by the operation of wind turbines, also known as “wind tower syndrome.”

Despite the many complaints and mobilizations promoted by social movements, unions, and the local populations themselves against the installation of wind farms close to their communities, the lobby of companies and investments in the sector tend to disregard the social and environmental perspectives as a way to block these processes.

## **2 THE WIND MONOCULTURE METAPHOR: A READING OF THE IMPACTS OF WIND ENERGY PRODUCTION IN BRAZIL**

The current Brazilian wind energy production model is based on centralized energy generation, which involves large-scale projects, considered “capable” of meeting the growth of energy supply in the country. Supported by this perspective, several wind farms have been installed, in the South and Northeast regions, reproducing a paradigm very close to the plantation in which monoculture tends to replace elements of the natural landscape.

If with the production of agribusiness the plantation model is expressed in the monoculture of sugar cane, coffee, cotton and soy, for example, the centralized generation of wind energy allows us to associate it with this practice through the multiplicity of wind turbines that invade the landscape of the countryside and seas and the processes of land acquisition, via leasing, as characteristic of latifundia.

In a comparative way, the forms of latifundio that favor the development and exploitation of a certain monoculture have always been posed as a threat to environmental diversity and autonomous social reproduction practices, in contrast to those in which both nature and local populations become submissive or dependent, when they do not promote processes of expropriation and deterritorialization.

About sugar cane, a vast literature has been concerned with demonstrating how the duet of land ownership and monoculture are incapable of producing distribution of wealth, and in many places where its exploitation takes place, there are historically low levels of education and health (ANDRADE, 2011). In the case of the presence of wind turbines, some data are already beginning to be published, demonstrating that wind monoculture tends to produce the same effects.

In the specific case of Paraíba, a study on energy sustainability that used environmental, social, and economic indicators was carried out by the Federal University of Campina Grande in the municipalities of Mataraca and Junco do Seridó. The results identified that, in 2004, the municipalities were in an average situation, but in 2014, there was an increase in poverty, when wind turbines had already been installed in these places (DEMENTSHUK, 2020).

### **3 LAND LEASING FOR WIND ENERGY PRODUCTION: A MODERN LAND GRABBING PROCESS**

Dispossession, according to the Brazilian Penal Code (CPB), comprises an act of stripping the possessor of his possession, violently or by abuse of trust (Art.161, II) (BRASIL, 1940). In the history and literature on the agrarian question in Brazil, this theme cuts out different situations, from those where the action of social movements in the countryside places the strategy of land occupation, as a measure to put pressure on the country's unequal agrarian structure, to those where the landowner uses justice around the so-called "prohibitory interdict" (Art. 932) to prevent the threat of imminent dispossession.

As is broadly understood, the dispossession of land affected, in the past, primarily the various original peoples, and in the present, it is this population that continues to witness the loss of their territories. To a significant extent, such action is promoted by the state itself when it produces policies for land colonization and economic development in which sectors linked to the energy economy, pastoralism, private colonization, extractive industry and agriculture are encouraged to explore spaces and indigenous territories themselves.

In 2021, the national congress was on the agenda to strengthen the process of dispossession of indigenous land with the bills (PL) favoring land grabbing, the definition of the time frame and the release

for mining and construction of hydroelectric plants in their territories (2633/2021 and 510/202, 191/2020 and 470/2007).

The advance in the proposition of bills on this theme is the result of the Brazilian experience itself, in which land grabbing became a frequent practice in many regions, where land grabbing and forged documents attributed land ownership to invaders. The most exemplary cases of this fact can be found in the complaints made in Pontal do Paranema, a large area of agrarian conflict in the state of São Paulo, by the Landless Workers Movement (MST).

In addition to these, it is necessary to consider the forms of dispossession characterized by tensions and violence practiced by jagunços (word use to describe people who use force in behalf of their employer) which are, usually, farm owners and owners of other businesses that involve the exploitation of nature and land grabbing) and, also, with the production of socio-environmental impacts that create unfavorable situations for the presence of fragile groups, from the point of view of security, public and political organizations, implying, in many cases, population displacement and land loss.

This means, in theory, that violent, even symbolic, forms of access to territories can result in situations of land dispossession, unlike those in which rural social movements are routinely framed when they claim recognition of the social function of land in unproductive properties. This claim today goes beyond the idea of unproductiveness to which the land is subjected, since the real situations of questioning the latifundia deepen with the logic of monoculture, the use of pesticides and the trail of inequalities that reach the entire radius of its influence.

In the specific case of wind energy production, we identified a “processo moderno de esbulho de terra, operado sob vias legais por meio de contratos de arrendamento” (SANTANA and SILVA, 2021:249), where companies enter rural territories harassing communities in the frantic pursuit of contract signatures. The main feature of the content

of this document is the definition of draconian clauses, in which the lessor loses the right to use his property, in addition to favoring the lessee with long contract terms, imposition of secrecy, absence of mediators (unions) at the time signature and so many other elements that make this instrument yet another expression of environmental injustice imposed on local communities. Therefore, the modern land grabbing process:

compreende os mecanismos legais utilizados pelas empresas com a finalidade de reduzir os direitos sobre a propriedade arrendada, definindo um conjunto de obrigações desiguais entre as empresas e os pequenos proprietários de terra, de forma a retirar-lhes a autonomia sobre ela (SANTANA e SILVA, 2021, p. 249).

This means that even though the lessor is, in fact, the legal owner of the land, the leasing contract deprives him of the right to use his property, imposing sanctions and limitations, even in those allowing small farmers to remain on their property. This logic imposes leases, in many cases, for more than 20 years, with automatic renewal contractual clauses, implying the continuity of that condition for more than one generation of farmers.

In this way, what we call the modern land grabbing process means the use of different mechanisms developed by companies, landowners and by the State itself, whose objective is to impose their interests on minority groups, depriving them, in the case of rural populations, of the right to land. It should be noted, unlike what happens in large-scale works, such as the construction of hydroelectric plants, that the displacement of entire communities occurs because of the socio-environmental liabilities of that enterprise. In the case of wind energy production, the permanence of populations comes at the price of the degradation of the quality of life resulting from the initial impacts of the installation of wind turbines (explosions, opening of roads, presence of people outside

the community, conflicting information and misinformation) and, subsequently, coexistence with noise, alteration of the local landscape, and continuous interference in the structures of residences etc.

More specific studies should compose a research agenda that seeks to present and deepen these and other impacts of an energy production that is defined as sustainable, renewable, and clean. In this regard, it is worth investigating the processes of dispossession, deterritorialization and migration that originate from the presence of these enterprises. In addition, it is still worth studying how those who remain in the localities build strategies to be capable of living with, resisting and denouncing the impacts destined for them.

#### **4 THE FIGHT AGAINST ENVIRONMENTAL INJUSTICES: PRESENTING EVIDENCE, PRODUCING INSTRUMENTS AND METHODOLOGIES IN DEFENSE OF AFFECTED POPULATIONS**

The Brazilian Environmental Justice Network (RBJA), created in 2001, is an important organization in the fight against environmental inequities practiced by governments and companies, either through political decisions or through the implementation of public or private undertakings that directly impact on the lives of poor, Black and ethnic populations.

Among its objectives are the development of instruments to promote environmental justice and the production of methodologies for 'Assessment of Environmental Equity' (HERCULANO, 2008). The network's performance meant the visibility of socio-environmental problems associated with practices of environmental injustice, outlined by criteria of color, ethnicity, social class, and gender. Therefore, the production of denouncements, maps, letters, reports, in addition to advising many affected communities, represents a key role played by

the Network in bringing together environmentalists, researchers, social movements and unions in search of environmental justice.

In Brazil, an example of this strategy was the preparation of the document “Análise crítica do estudo de impacto ambiental do aproveitamento hidrelétrico de Belo Monte”, (MAGALHÃES and HERNANDEZ, 2009) carried out by the panel of specialists, pointing out the problems and gaps in the Environmental Impact Study (EIA) of that hydroelectric plant.

Many experiences have been accumulating, such as the construction of social maps, mobilizations around complaints, judicialization of conflicts, the articulation of entities in Climate Justice Forums, Human Rights Committees and other initiatives that seek to give visibility to environmental injustices.

In the specific case of the socio-environmental impacts of wind energy production, civil society is seeking to occupy spaces for debate by holding public hearings and promoting delegations for field visits, made up of union entities and political representatives. In several states in the Brazilian Northeast, where the implementation of wind complexes has been taking shape, audiovisual production initiatives stand out to portray changes in the environment and the misfortunes with which the populations affected by the projects are living, in addition to the absence of public policies.

The Articulation Against the Impacts of Wind Farms in Pernambuco (ACIPE) seeks to mobilize farmers, unions, associations, professionals, researchers, and entities to influence the issue. Since 2015, with the promotion of the Wind Farms and Socio-environmental Impacts Seminar, held in the city of Brejo da Madre de Deus, the entity has been acting to charge the state government with protective actions for rural populations and nature, especially in the marshes of altitudes where there are remnants of primary and secondary Atlantic forest.

Other actions to disseminate information and awareness regarding the impacts of wind energy are being conducted in partnership with the Federal Rural University of Pernambuco (UFRPE) and the Federal University of Paraíba (UFPB) through the Dom Quixote Project by proposing research and extension in the municipality of Bonito (PE) and Santa Luzia (PB). Likewise, folders, booklets and videos are produced by entities such as *Cáritas NE2*, the Federation of Rural Workers, Farmers and Family Farmers of the State of Pernambuco (FETAPE), aimed at communities and populations already affected, in addition to those who are on the sight of wind power companies.

Considering that many times the implantation of wind complexes takes advantage of the absence of specific legislation and the lack of supervision, on the part of government agencies, in relation to the impacts of these undertakings, the organization and performance of environmentalists, along with some environmental councils has produced effects. This is the case of Municipal Law No. 3,419, of January 25, 2022, of the municipality of Belo Jardim (PE), which aims to regulate the authorization for letters of consent in relation to a renewable energy project in this municipality, which became known, paradoxically, as the “law of wind”. The institution of this law is the result of the efforts of a group of activists seeking to influence public spaces to mitigate the perverse effects of the arrival of companies in the rural areas of the municipality.

Although such strategies point to organizational advances and the performance of social movements, the scope of efforts made in the action of making visible, denouncing and combating the impacts of wind energy production, as a manifestation of a type of environmental injustice, is limited to financial difficulties and organizational aspects of communities, the distance from urban areas in terms of displacement and human capital available to work in these territories. On the other side of the conflict, the companies have transport and personnel capable

of entering the most distant communities and starting the process of harassing their populations, such as what happened in many cases in the municipality of Belo Jardim, where counselors of the Municipal Council for the Defense of the Environment (CONDEMA) reported how representatives of the projects managed to sign hundreds of contracts in the midst of the Covid-19 pandemic, in 2020.

## **5 CONCLUSION**

The current scenario of the race for the exploitation of wind forces highlights the centralized model of wind energy production. Little is seen of the debate on forms of fair and popular energy transition, possibly due to the hegemonic discourse, which guides advertisements and journalistic articles, and places wind energy as a viable alternative to the current model, focused on fossil fuels and the construction of hydroelectric plants, without establishing differences between centralized and decentralized energy production. Likewise, the general idea that the production of wind energy would not be so harmful to society and nature is in favor of the current model, since it is a renewable and clean alternative, allowing it to be associated with more contemporary environmental concerns.

The need for a fair and popular energy transition is based on the understanding that the current model seeks to produce a repertoire of alternatives and strategies, based on the incorporation of environmental concerns, triggering technical responses to the problems produced by capitalism, but without questioning the current civilization standard which reinforces the logic of the consumer society through the unrestrained exploitation of natural resources, associated with the degradation of work and human dignity.

As proclaimed in the public letter of the Fair and Popular Energy Transition Seminar – To the Northeast of us! held between May 8

and 15, 2021: “Evidenciamos a falácia das falsas soluções e das políticas compensatórias dos grandes empreendimentos de energia eólica e solar que estão causando conflitos e grandes impactos socioambientais” (NOVOS PARADIGMAS, 2021).

The various evidence of the trail of problems caused by wind energy companies reinforce the urgent need to rethink public funding for the sector, questioning the environmental and social injustices present in the violation of rights and in the allocation of negative externalities to communities and local populations.

Finally, it should be noted that clean energy, as it has been practiced by companies in the wind energy sector, is a farce, as it suggests that in its process social rights have not been neglected and that environmental impacts can be mitigated. What we have witnessed reveals the opposite, since rural and fishing populations have been affected by the side effects of the environmentalization of capitalism.

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中国可再生能源的许可与社会环境补偿制度与政策研究

**INTRODUÇÃO AO LICENCIAMENTO DE ENERGIA RENOVÁVEL  
DA CHINA, BEM COMO A POLÍTICAS E SISTEMAS DE  
COMPENSAÇÃO SOCIAL E AMBIENTAL**

**INTRODUCTION TO CHINA'S RENEWABLE ENERGY LICENSING  
AS WELL AS SOCIAL AND ENVIRONMENTAL COMPENSATION  
POLICIES AND SYSTEMS**

崔晓瑜 (Xiaoyu Cui)



## 摘要

可再生能源在减少碳排放方面作用突出，兼具生态价值与经济价值，因此备受全球推崇。但不可忽视的是，可再生能源在开发建设过程中也不免产生对生态环境的负面影响和对相关群体的利益损害，但只要采取有效措施，这些影响完全可控。效益与生态可以兼顾，产业发展与自然保护也可以协同。为了最大程度地减少损害弥补损失，我国通过在用地、环境、社会风险等重点领域适用许可与补偿制度，来预防和解决可能出现在可再生能源开发建设过程中的问题和平衡各方主体的利益，使可再生能源能够在适当的规划和政策框架下生态友好地快速发展。

**关键词：**可再生能源；许可；补偿；社会环境

## RESUMO

A energia renovável desempenha um papel proeminente na redução das emissões de carbono, com valor ecológico e econômico, por isso é altamente respeitada globalmente. No entanto, não se pode ignorar que, enquanto as energias renováveis estão em processo de desenvolvimento e construção, as energias renováveis terão inevitavelmente um impacto negativo no ambiente ecológico e prejudicarão os interesses dos grupos relevantes. No entanto, desde que medidas eficazes sejam tomadas, esses efeitos são completamente controláveis. Benefícios e ecologia podem ser levados em conta, e desenvolvimento industrial e proteção da natureza também podem ser coordenados. A fim de minimizar danos e compensar perdas, a China aplica sistemas de licenciamento e compensação em áreas-chave como uso da terra, meio ambiente e riscos sociais para prevenir e resolver problemas que possam surgir no processo de desenvolvimento e construção de energias renováveis, e

para equilibrar os interesses de todas as partes, Permitir que as energias renováveis se desenvolvam rapidamente e respeitadoras do ambiente, com quadros políticos e de planeamento adequados.

**Palavras-chave:** Energia renovável; Licença; Compensação; Ambiente social.

## ABSTRACT

Renewable energy plays a prominent role in reducing carbon emissions, with both ecological value and economic value, so it is highly respected globally. However, it cannot be ignored that while renewable energy is in the process of development and construction, renewable energy will inevitably make a negative impact on the ecological environment and damage to the interests of relevant groups. However, as long as effective measures are taken, these effects are completely controllable. Benefit and ecology can be taken into account, and industrial development and nature protection can also be coordinated. In order to minimize damages and make up for losses, China applies licensing and compensation systems in key areas such as land use, environment, and social risks to prevent and solve problems that may arise in the process of renewable energy development and construction, and to balance the interests of all parties, enabling renewable energy to develop rapidly and eco-friendly with appropriate planning and policy frameworks.

**Key words:** Renewable energy; License; Compensation; Social environment.

## 1 INTRODUCTION

To combat climate warming, the world is committed to the development and utilization of renewable energy. As a clean, renewable and unexhausted energy source, renewable energy plays a positive role in environmental protection and energy security for both utilitarian and non-utilitarian purposes to motivate the public sector and private benefit groups. On the other hand, due to the inherent negative externalities of energy development, the instability of renewable energy itself and the immature development technology and other subjective and objective reasons, the renewable energy market has encountered problems such as excessive investment, repeated construction and market order disorder. Today, as a clean and green energy source, the renewable energy itself has developed to such a new stage: it is necessary to solve the harmless and green problems of the whole life cycle of its development, construction, operation and maintenance, use and decommissioning. In order to avoid the waste of resources and environmental damage, protect the rights and interests of interested parties, and guide the healthy development of the industry, the development and utilization of renewable energy must be restricted. Between incentives and restrictions, national laws balance the interests in the energy sector by establishing a licensing system.<sup>[20]</sup> The license of renewable energy projects includes the project approval license and grid-connected power generation license, and the project approval license also includes the approval system of investment permission, land use permit, environmental approval and other aspects. The procedures are relatively complex, but the social environment is mainly related to the specific fields such as land use and environment. This paper

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<sup>20</sup> 《中华人民共和国可再生能源法》第13条规定：“国家鼓励和支持可再生能源并网发电。建设可再生能源并网发电项目，应当依照法律和国务院的规定取得行政许可或者报送备案。”

introduces the licensing and social environment compensation in the field of land and renewable energy through the licensing of land and environment, and the compensation system of people, environment and community involved.

## **2 LAND USE PERMISSION AND LAND REQUISITION COMPENSATION**

### **2.1 LAND PLANNING AND PERMISSION**

The development of renewable energy, especially climate resources, often requires a certain above-ground space, which requires the adjustment of land use planning.

China has drawn up general plans for land use, prescribed the use of land, and divided land into agricultural land, construction land and unused land.<sup>[21]</sup>In principle, China adheres to the principle of giving priority to conservation, adheres to the use of unused land as far as possible, and occupies less or doesn't occupy agricultural land, forest land, grassland and other agricultural land and wetlands, etc.<sup>[22]</sup>Specific to the renewable energy field, there are also relevant provisions: "make full use of desert, Gobi, desert and other unused land, the layout of the

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<sup>21</sup> Agricultural land refers to the land directly used for agricultural production, including cultivated land, woodland, grassland, irrigation and water conservancy land and aquaculture water surface; Construction land refers to the land for building buildings and structures, including urban and rural housing, land for residential and public facilities, industrial and mining land, transportation and water conservancy facilities, tourism land and military facilities; unused land refers to land other than agricultural land and construction land. See Article 4 of the Land Administration Law of the People's Republic of China.

<sup>22</sup> 参见《中华人民共和国森林法》第37条、《中华人民共和国湿地保护法》第19条、《中华人民共和国土地管理法实施条例》第20条、《土地复垦条例》第4条、《节约集约利用土地规定》。

construction of large wind power base”;<sup>[23]</sup>the construction land of wind power project should be based on the principle of economical and intensive use of land, try to use unused land, less or no farmland, and try to avoid the government departments at or above the provincial level approved by the areas requiring special protection.”<sup>[24]</sup>When the agricultural land and collective land is involved, the project construction unit should go through the conversion of agricultural land and land expropriation procedures according to law,<sup>[25]</sup>and make compensations.<sup>[26]</sup>

## 2.2 COMPENSATION FEE SYSTEM

In terms of cultivated land, the compensation fees for the expropriated collectively-owned land include the land compensation fees, the resettlement subsidies, and the compensation fees for the above-ground attachments and green seedlings.<sup>[27]</sup>Among them, the land compensation fee is the compensation for the loss of the investment and income of the land owners in the land, and the resettlement subsidy fee is the compensation for the livelihood of the farmers in the expropriated land. The distribution principle of the resettlement subsidy is “whoever settles enjoys”, that is, if the farmer accepts unified resettlement, the resettlement subsidy will be paid to the resettlement

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<sup>23</sup> 国务院办公厅转发的国家发改委、国家能源局《关于促进新时代新能源高质量发展的实施方案》，国办函〔2022〕39号，2022年5月14日发布。

<sup>24</sup> 《风电场工程建设用地和环境保护管理暂行办法》（发改能源〔2005〕1511号），第3条。

<sup>25</sup> 参见《风电场工程建设用地和环境保护管理暂行办法》第8条、《中华人民共和国土地管理法》第44条。

<sup>26</sup> 参见《中华人民共和国土地管理法》第2条、第30条；中共中央办公厅、国务院办公厅发布的《关于深化生态保护补偿制度改革的意见》规定：“建立健全依法建设占用各类自然生态空间的占用补偿制度”。

<sup>27</sup> 参见《中华人民共和国土地管理法》第48条、《中华人民共和国民法典》第243条、《中华人民共和国电力法》第16条。

unit; if the farmer gives up unified resettlement, seeks employment or resettlement, the resettlement subsidy shall be paid directly out to the expropriated farmers. Green seedling compensation fee is a kind of compensation fee paid by to the requisitioned land that are damaged due to the expropriated land. Attachment compensation fee is a kind of compensation fee that the land use unit pays to the attachment on the requisitioned land taken, such as the house, other facilities, because the land acquisition is damaged.<sup>[28]</sup>”The compensation expenses for the ground attachments and green seedlings, etc., shall belong to the owner. “The standard of land compensation fees and resettlement subsidies for expropriated agricultural land shall be determined by provincial governments by formulating and announcing the comprehensive land price of districts. The comprehensive land price of the district shall take into account the original use of land, land resource conditions, land output value, land location, land supply and demand relationship, population and economic and social development level, and shall be adjusted or re-announced at least once every three years. The compensation standards for the expropriation of other land, above-ground attachments and green seedlings shall be formulated by the provincial governments.<sup>[29]</sup> Where the land compensation fees and resettlement subsidies paid in accordance with the current law cannot enable the farmers with land expropriated to maintain the original living standards and are not enough to pay the social security fees for the landless farmers caused by land expropriation, the provincial people’s government shall approve the increase of the resettlement subsidies. Where the sum of land compensation fees and resettlement subsidies reaches the legal upper limit, which is not enough for the farmers whose land has been expropriated to maintain their original

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<sup>28</sup> 《中华人民共和国土地管理法实施条例》，第32条。

<sup>29</sup> 参见《中华人民共和国土地管理法》第48条。

living standards, the local people's government may subsidize the income from the paid use of state-owned land.<sup>[30]</sup>

In terms of forestland, "for those who requisition or occupy forest land, the land-using units shall pay compensation fees for forest land, forest trees, forest vegetation restoration fees and resettlement subsidies according to relevant regulations. "Among them, the compensation fee for forest land and trees shall be paid to the owner or use right of the woodland being expropriated or expropriated, and the forest vegetation restoration fee shall be specially used for the restoration of forest vegetation."<sup>[31]</sup>

In terms of grassland, "those who expropriate, requisition or use of grassland for construction shall pay for grassland vegetation restoration. "Grassland vegetation restoration fee is specially used to restore grassland vegetation."<sup>[32]</sup>

### **3 ENVIRONMENTAL PROTECTION APPROVAL AND ECOLOGICAL PROTECTION COMPENSATION**

Renewable energy plays a prominent role in reducing carbon emissions, but the potential negative impact on ecosystem services also needs to be emphasized. If the construction planning and site selection is improper, it may continuously bring a "lock-in effect" of negative impact on the ecological environment and ecological function for a long time.

#### **3.1 ENVIRONMENTAL IMPACT ASSESSMENT SYSTEM**

The environmental protection administrative licensing system is an effective administrative management system adopted by the state

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<sup>30</sup> 参见《国务院关于深化改革严格土地管理的决定》三（十二）。

<sup>31</sup> 《关于进一步加强林地保护管理工作的请示》，国办发〔1992〕32号。

<sup>32</sup> 《中华人民共和国草原法》，第39条。

to strengthen the environmental management, and the environmental impact assessment system is an organic part of it. The approval of environmental impact assessment report is an administrative license for environmental protection of natural resources for the purpose of controlling the adverse impact of ecological environment. Environmental impact assessment refers to “the methods and systems for analyzing, predicting and evaluating the possible environmental impact after the implementation of planning and construction projects, proposing countermeasures to prevent or mitigate adverse environmental impact, and conducting follow-ups and monitoring.”<sup>[33]</sup>

The development and utilization of climate resources will inevitably produce some environmental problems, so the “wind farm engineering construction projects will implement the environmental impact assessment system”. The subject of the evaluation and preparation of the environmental impact assessment report documents can be either the construction unit itself or the third party entrusted by the construction unit.<sup>[34]</sup> First of all, the wind farm project construction land implements the pre-examination procedure, and the project shall not apply for approval before obtaining the project environmental impact assessment approval documents.<sup>[35]</sup> Secondly, the State implements classified management based on the environmental impact assessment of the construction project, which may cause significant environmental impact, make analysis or special evaluation of the environmental impact, and the environmental impact registration form shall be filled in.<sup>[36]</sup> The environmental impact statement of construction project shall include the following contents: (1) overview of construction project;

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<sup>33</sup> 《中华人民共和国环境影响评价法》，第2条。

<sup>34</sup> 《风电场工程建设用地和环境保护管理暂行办法》，第9条；参见《中华人民共和国环境保护法》第19条。

<sup>35</sup> 参见《风电场工程建设用地和环境保护管理暂行办法》第5-7条、第11条。

<sup>36</sup> 参见《中华人民共和国环境影响评价法》第16条。

(2) current situation of surrounding environment of construction project; (3) analysis, prediction and evaluation of possible environmental impact of construction project; (4) environmental protection measures of construction project and technical and economic demonstration of construction project; (5) economic profit and loss analysis of environmental impact of construction project; (6) suggestion of environmental monitoring of construction project; (7) conclusion of environmental impact assessment. The content and format of the environmental impact report form and the environmental impact registration form shall be formulated by the competent department of ecological environment under The State Council.<sup>[37]</sup>

### 3.2 APPROVAL OF WATER AND SOIL CONSERVATION

To start a production and construction project that may cause soil erosion in areas prone to it, the production and construction unit shall compile or entrust institutions with corresponding technical conditions to work out plans for soil and water conservation, and submit them to the water conservancy administrative department of the government at or above the county level for examination and approval. The soil and water conservation program includes the scope, objectives, measures and investment of soil erosion prevention and control.<sup>[38]</sup> For wind power projects that implement the approval system, the approval procedures of soil and water conservation plan shall be completed before submitting the project application report.<sup>[39]</sup> After

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<sup>37</sup> 参见《中华人民共和国环境影响评价法》第17条。

<sup>38</sup> 参见《中华人民共和国水土保持法》第25条。

<sup>39</sup> 国务院《政府核准的投资项目目录（2016年本）》关于须报送核准的发电项目规定：“风电站：由地方政府在国家依据总量控制制定的建设规划及年度开发指导规模内核准。”《开发建设项目水土保持方案编报审批管理规定》第2条规定：“核准制项目，在提交项目申请报告前完成水土保持方案报批手续。”

the water and soil conservation plan is approved, if the location and scale of the production and construction project are significantly changed, the water and soil conservation plan shall be supplemented or modified and submitted to the original examination and approval authority for approval. During the implementation of the water and soil conservation plan, if major changes in the water and soil conservation measures need to be made, they shall be approved by the original examination and approval authority.”<sup>[40]</sup>

If soil erosion is caused in the production and construction project, it shall be treated; if the soil and water conservation facilities, landforms and vegetation are damaged, and the original function of soil and water conservation cannot be restored, the compensation of soil and water conservation fee shall be paid for the prevention and treatment of soil erosion.<sup>[41]</sup>

### **3.3 GEOLOGICAL HAZARD RISK ASSESSMENT, EARTHQUAKE SAFETY ASSESSMENT, FLOOD IMPACT ASSESSMENT**

“For engineering construction in geological disaster-prone areas, geological disaster risk assessment shall be carried out in the feasibility study stage, and the assessment results shall be included as part of the feasibility study report; if the feasibility study report does not include the geological disaster risk assessment results, it shall not be approved.”<sup>[42]</sup>

In terms of earthquake prevention,

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<sup>40</sup> 《中华人民共和国水土保持法》第25条。

<sup>41</sup> 参见《中华人民共和国水土保持法》第32条。

<sup>42</sup> 《地质灾害防治条例》，第21条。

“New construction, expansion, and reconstruction of construction projects should avoid causing damage to earthquake monitoring facilities and the earthquake observation environment. If the construction of a national key project cannot avoid causing damage to the earthquake monitoring facilities and the earthquake observation environment, the construction unit shall follow the local people’s government at or above the county level and shall build additional anti-jamming facilities as required by the department or agency responsible for the management of earthquake work”<sup>[43]</sup>.

In terms of flood control and governance, “In the construction of non-flood control construction projects in floodplain areas and flood storage and detention areas, an evaluation shall be made on the possible impact of floods on the construction project and the possible impact of the construction project on flood control, and a flood impact evaluation report shall be prepared. If the flood impact assessment report has not been reviewed and approved by the relevant water administrative department, the construction unit shall not start construction.”<sup>[44]</sup>

## **3.4 COMPENSATION SYSTEM FOR ECOLOGICAL PROTECTION**

### **3.4.1. OVERVIEW OF THE ECOLOGICAL PROTECTION COMPENSATION SYSTEM**

The Environmental protection administrative licensing system can cause significant damage to the ecological project, and the

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<sup>43</sup> 《中华人民共和国防震减灾法》，第24条。

<sup>44</sup> 《中华人民共和国防洪法》，第33条。

ecological and environmental impact, however, the construction project under the normal construction and operation of the impact or damage is powerless, making this part of the ecological and environmental private cost into the social cost.<sup>[45]</sup>According to the legal principle, this part of the cost should be borne by the cost manufacturer, and the idea of the ecological protection compensation system born accordingly.<sup>[46]</sup>”Ecological compensation mechanism refers to the comprehensive consideration of ecological protection cost, development opportunity cost and ecological service value, on the basis of financial transfer payments or market transactions, giving reasonable compensation to the ecological protector, clearly define ecological protection rights, beneficiaries and obligations, and make the ecological protection economic externalities internalization of public system arrangement.<sup>[47]</sup>”Therefore, the essence of ecological protection compensation is in the balance of ecological protectors, resource developers, ecological beneficiaries and the interests between ecological damage, through beneficiaries, developers, destroyer pay or market transactions, ecological compensation fund, national financial transfer payments, reward ecological reward, make ecological damage and personal compensation.

According to the basic principle of “who benefits, who compensates”, the subject of ecological protection compensation is the beneficiary of ecological protection or ecological damage, and the subject of compensation is the ecological protected or damaged. The

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<sup>45</sup> 参见陈玲：《从被“许可”的破坏到生态补偿附款许可——我国海洋工程环境行政许可的制度检视与变革路向》，载《华南师范大学学报（社会科学版）》2012年第3期，第137页。

<sup>46</sup> 《关于深化生态保护补偿制度改革的意见》规定：“建立占用补偿、损害赔偿与保护补偿协同推进的生态环境保护机制。”

<sup>47</sup> 徐绍史（发展和改革委员会主任）：《国务院关于生态补偿机制建设工作情况的报告》，2013年4月23日在第十二届全国人民代表大会常务委员第二次会议上。

former refers to the individuals, units and local people's governments that benefit from ecological protection activities such as maintaining and creating ecological service value, or develop and utilize environmental and natural resources to damage the ecological environment; the latter refers to the individuals, units and local people's governments that invest human resources, material resources, financial resources or limited development opportunities, or suffer losses due to ecological damage. The establishment and implementation of the ecological compensation system are generally from two aspects: on the one hand, they strengthen the use of administrative means, and the government promotes ecological compensation through financial transfer payment; on the other hand, they strengthen the use of market means to achieve the purpose of ecological compensation through consultation between protectors and beneficiaries. Its specific forms include: "state (public) compensation financial transfer payment; ecological compensation fund; market transactions; participation of enterprises and individuals."<sup>[48]</sup> The ecological protection compensation system contains many subsystems, and the balance system of land occupation compensation is one of the more characteristic subsystems.

### 3.4.2 BALANCE SYSTEM OF OCCUPATION AND COMPENSATION OF CULTIVATED LAND, WOODLAND AND WETLAND

Where renewable energy construction projects really need to occupy cultivated land, forest land and wetlands, the balance system

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<sup>48</sup> China has established the Central Forest Ecological Benefit Compensation Fund, which is a special fund to subsidize the construction, tending, protection and management expenditures incurred by the key public welfare forest managers and protectors, and is arranged by the central financial budget. The scope of compensation is forest land among the key public welfare forest land announced by the State Forestry Administration, as well as sparse forest land, shrub land and shrub land in areas with severe desertification and soil erosion.

between the occupation and compensation of cultivated land, forest land and wetlands shall be implemented. Fill balance system refers to the construction project legally occupied cultivated land or natural ecological space, compensation of occupied cultivated land or natural ecological space, strives to achieve “in area or ecological value” and “fill” dynamic balance, effectively making up for all kinds of construction occupied cultivated land or natural ecological space losses. At present, the balance system of cultivated land occupation and compensation is relatively mature, with strict requirements on the quality and quantity of compensated cultivated land, and the purpose is to achieve the balance of ecological value, and the balance system of occupation and compensation of forest land and wetland is still in the primary stage, only on the balance of area occupation and compensation.

In terms of cultivated land, according to the principle of “how much is occupied and how much is reclaimed”, the unit occupying the cultivated land shall be responsible for the reclamation of cultivated land equal to the quantity and quality of the cultivated land occupied. If there are no conditions for reclamation or the cultivated land does not meet the requirements, the land reclamation fee shall be paid for the reclamation of new cultivated land.<sup>[49]</sup> However, if the amount of newly reclaimed cultivated land after the new amount of cultivated land is insufficient to compensate for the amount of cultivated land occupied, it must be approved by The State Council to reduce the amount of cultivated land reclaimed within the local administrative area, and the quantity and quality of the cultivated land.<sup>[50]</sup>

The occupation of forest land and wetland is controlled by the total amount, mainly with the area balance. In terms of forest land, in order to ensure that the amount of forest land is not reduced,

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<sup>49</sup> 参见《中华人民共和国土地管理法》第30条、《国务院关于深化改革严格土地管理的决定》（国发〔2004〕28号）一（三）。

<sup>50</sup> 参见《中华人民共和国土地管理法》第32条。

the forest land occupied by various construction projects shall not exceed the control index of the total amount of occupied forest land in the respective administrative area. In case of occupation of forest land, the government shall arrange for afforestation and restore forest vegetation. The area of afforestation shall not be less than the area of forest vegetation reduced by the occupation of forest land. At the same time, the units occupying the forest land shall also pay the forest vegetation restoration fees, which shall be specially used for afforestation and restoration of forest vegetation.<sup>[51]</sup>In terms of wetlands, “land use units should be responsible for restoring or rebuilding the wetlands equal to the occupied wetlands in accordance with the principle of ‘compensation first, and balancing occupation and compensation’, so as to ensure that the wetland area is not reduced.”<sup>[52]</sup>

#### **4 RISK ASSESSMENT MECHANISM FOR SOCIAL STABILITY**

As a major project related to the national economy and people’s livelihood, its influence affects land acquisition, housing demolition, resettlement security and environmental change. “In the context of enhanced interaction between various fields of the modern social system, major engineering projects often become the intersection of ‘economic — social — political’ events, and also the concentration of social stability risks, and the role of ‘ripple effect’ has far-reaching and extensive external effects.<sup>[53]</sup>” In order to prevent and reduce the unstable factors of major engineering projects from the source, and to

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<sup>51</sup> 参见《中华人民共和国森林法》第37条。

<sup>52</sup> 《国务院办公厅关于印发湿地保护修复制度方案的通知》，国办发〔2016〕89号；《湿地保护管理规定》第30条。

<sup>53</sup> 胡智强：《我国重大工程项目社会稳定风险评估规制路径研究》，载《河北法学》2013年第12期，第106页。

avoid the crisis causing social and political consequences in the process of project construction and operation, China has created a social stability risk assessment mechanism with distinctive Chinese characteristics. Social stability risk assessment is a major project front evaluation program, that generally refers to “the closely related to the people’s livelihood of major decisions, major projects, before introduction or approval, the factors may affect social stability of scientific, systematic prediction, analysis and evaluation, formulate risk response strategies and plans, to effectively avoid, prevent, reduce, control and deal with the risk to the threat of social stability.”<sup>[54]</sup>

Generally speaking, the general principle of “who is in charge, who is responsible, who is responsible” is followed. The construction department of major projects is the responsible for risk analysis and assessment.<sup>[55]</sup> In the evaluation, social organizations, professional organizations and experts can be invited to participate in the evaluation according to practical needs, or third-party evaluation agencies can be directly introduced as the evaluation subject.

The social stability risk assessment of major engineering projects follows the procedures of risk identification, risk analysis, risk classification and risk control. First of all, risk identification refers to the analysis and evaluation of the legality, rationality, feasibility, safety or controllability and other related issues of the evaluation project, so as to comprehensively and accurately identify various risk factors, the types of possible emergencies and the causes of events. The legitimacy assessment criteria include: (1) whether it conforms

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<sup>54</sup> 杨雄、刘程：《加强重大项目社会稳定风险评估刻不容缓》，载《探索与争鸣》2010年第10期，第32页。

<sup>55</sup> 例如《关于印发北京市电网建设项目开展社会稳定风险评估暂行规定的通知》（京管发〔2018〕58号）第3条规定：“开展本市电网项目风险评估工作的主体为项目建设单位”；《莆田市人民政府办公室关于实施重大建设项目社会稳定风险评估工作的意见》（莆政办〔2011〕50号）规定：“项目建设单位是项目社会稳定风险分析和评估的责任主体。”

to the policies and laws and regulations of the party and the state; and (2) whether it conforms to the prescribed decision-making procedures. The rationality evaluation criteria include: (1) whether it represents the fundamental interests of the majority and gets the understanding and support of the majority; (2) whether the strength of the reform, the speed of development and the social affordability; (3) whether the long-term and practical interests of the people and the reasonable demands of the interests in all aspects. The feasibility evaluation criteria include: (1) whether the scientific feasibility study is demonstrated; (2) whether the relevant constraints are fully considered, whether the supporting measures are perfect, whether the time is ripe, whether it will cause unstable factors after implementation, etc. Safety or controllability assessment criteria include: (1) whether there are hidden dangers that greatly affect social security and social stability; (2) whether there are joint risks or other hidden dangers affecting social stability; (3) whether there are corresponding prediction and early warning measures and emergency response plans; (4) whether there are countermeasures to resolve unstable factors.<sup>[56]</sup>In this process, attention should be paid to fully listen to the opinions of all parties to avoid the formulaic calculation of the risk degree. Secondly, the possibility of emergencies under the existing management conditions, as well as the potential consequences and scope of influence are analyzed. Specifically, it includes the possible conflicts caused by the implementation of the evaluation project and the number, scope and intensity of the personnel involved. Thirdly, on the basis of analyzing the possibility of emergency occurrences and its consequences, the evaluation subject classifies the risk according to the standard value

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<sup>56</sup> 参见《关于印发北京市电网建设项目开展社会稳定风险评估暂行规定的通知》第6条、《莆田市人民政府办公室关于实施重大建设项目社会稳定风险评估工作的意见》、《深圳市重大事项社会稳定风险评估办法》（深办〔2008〕6号）第5条。

of the accident risk to determine the focus of management. Finally, precise control measures should be taken according to the risk size: for acceptable or allowable risks, monitoring measures should be established to prevent increased risk value; for the risks above the standard value, a special management plan should be established to control the risks, eliminate or reduce the possibility of emergencies, and take preventive measures for unavoidable risks.<sup>[57]</sup>

A report shall be formed after the evaluation. The report form has some flexibility, which can be either an independent assessment report, a social stability risk assessment and analysis chapter (embedded in the engineering project feasibility report), or a simple assessment report.<sup>[58]</sup> The contents of the report generally include the evaluation items and the evaluation process, the opinions of all parties and their adoption, the social stability risks that may be caused by the decision-making, the risk assessment conclusions and countermeasures, the risk prevention and mitigation measures, and the emergency response plans.<sup>[59]</sup>

The opinion on social stability risk assessment of major construction projects is one of the important basis for project approval. Evaluation of territorial management, grading, by all levels responsible for the management of planning, land and resources, Marine, forestry, environmental protection, construction and other administrative departments, in the performance of the project site selection, land

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<sup>57</sup> 参见杨雄、刘程：《加强重大项目社会稳定风险评估刻不容缓》，载《探索与争鸣》2010年第10期，第36页、《关于印发北京市电网建设项目开展社会稳定风险评估暂行规定的通知》、《莆田市人民政府办公室关于实施重大建设项目社会稳定风险评估工作的意见》。

<sup>58</sup> 参见朱正威、胡向南、石佳：《社会稳定风险评估机制的实践进展、现实问题与完善策略——基于社会稳定风险评估报告的内容分析》，载《南京社会科学》2019年第11期，第74页。

<sup>59</sup> 《关于建立健全重大决策社会稳定风险评估机制的指导意见（试行）》，中办发〔2012〕2号。

(sea, forest), environmental impact assessment, demolition permit before administrative approval procedures, according to their respective functions of the project construction unit of social stability submitted by the risk assessment report.<sup>[60]</sup>

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<sup>60</sup> 参见《深圳市重大事项社会稳定风险评估办法》第3条、《莆田市人民政府办公室关于实施重大建设项目社会稳定风险评估工作的意见》。

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