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Unlocking Global Energy Cooperation: Harnessing the Data Diplomacy Potential of the ENETRIX Platform

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Abstract: This research note introduces ENETRIX as an essential platform designed to document, monitor, and evaluate Brazil's energy diplomacy. The platform provides users with crucial information derived from international energy agreements to which Brazil is a signatory. Developed by the Energy Security Studies Group (Gesene) within the Department of International Relations at the Federal University of Paraíba, ENETRIX serves as a strategic tool for promoting international energy cooperation. This article explores the platform's potential as a vehicle for data diplomacy, aimed at strengthening global energy partnerships. The article also seeks to contextualize ENETRIX within broader discussions on data governance and state-managed repositories of international agreements. The analysis details the platform's development process, architectural design, key functionalities, and the tangible impacts it has achieved thus far. Additionally, this exploration offers a critical analysis of the challenges and lessons learned throughout the platform's implementation and ongoing operation.

Keywords: Data diplomacy; energy cooperation; innovation technology; government repositories.

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Introduction

Energy plays a pivotal role in both international negotiations and the broader dynamics of global relations, underpinning many aspects of modern society. As global energy demand increases and international interdependence intensifies in an increasingly hyperconnected world, countries face the dual challenge of securing reliable energy supplies while addressing the environmental consequences of energy production and consumption. This situation calls for a shift towards alternative energy sources and further investments in more efficient and sustainable technologies (PAIVA, 2019).

Many scholars contend that the shift toward a low-carbon energy matrix is fundamentally transforming the geopolitics of energy, particularly by redefining power relations between energy producers and consumers (O'SULLIVAN et al. 2017; OVERLAND, 2019; SCHOLTEN, 2018; SOVACOOL, 2016; THE ECONOMIST, 2018). As governance structures become more complex – incorporating a wider range of actors such as scientists and technology providers – there is a corresponding rise in the need for greater investment in evidence-based scientific research, driven largely by advancements in renewable energy technologies (FATTOUH and MAHADEVA, 2013; GRIFFITHS, 2019; KUZENKO et al., 2019).

Diplomacy and international cooperation emerge as vital instruments for tackling global energy challenges. Effective negotiations rely heavily on data, as the foundation for informed decision-making in international relations. Data shapes government policies, guides organizational strategies, and influences actions across the global private sector. It also helps monitor global trends, assess risks and opportunities, and enhance transparency and accountability to civil society and international stakeholders (BOYD et. al., 2019).

The digital age has ushered in an explosion of information, with vast amounts of data being generated and disseminated at unprecedented speeds. Traditional approaches to data management have evolved alongside technological progress, leading to the development of sophisticated systems designed to streamline data collection and analysis. These emerging technologies, which enhance the ability to process and interpret large datasets, are reshaping social interactions, such as communication and workplace dynamics, while also posing significant challenges for bureaucracies tasked with managing and responding to this rapidly expanding data environment (ASHBROOK, 2020).

Several initiatives have emerged to create energy-related databases, particularly focusing on the collection analysis of text data sets. Among them,

the FOIArchive (Freedom of Information Archive) stands out as a comprehensive repository containing over three million documents related to state diplomacy, with substantial emphasis on the United States. The archive includes both previously classified (private) and public documents, covering diplomatic activities at various levels and across a wide range of topics. This resource allows users to analyze sets of previously classified (or publicly unavailable) internal government documents, providing access to the raw, often complete, text of these documents. Researchers can explore the documents online, analyze statistics, and use the platform's application programming interface (API) to download and visualize customized data sets (CONNELLY et al., 2021).

Another noteworthy international initiative is the Energy Security Sentinel, which offers an interactive report on geopolitical risks and energy prices, with a particular focus on economic trends and the commodities sector. The platform evaluates the impact of natural disasters, sanctions, and armed conflicts on the energy industry, using a variety of visualization tools such as graphs and interactive maps. Its primary emphasis is on investment risks stemming from global interdependence and the effects of geopolitical conflicts and natural disasters, without addressing international cooperation. The Sentinel offers a clear and interactive presentation of information, grounded in detailed analyses of the global energy landscape.

In Brazil, several similar initiatives are currently underway. One notable example is CoopDatum, an observatory at PUC Minas that tracks collaboration between Brazilian states and international organizations. The platform presents data through interactive maps and visualizations, covering topics such as foreign trade, interstate cooperation, and diplomacy. Information is delivered through an accessible system that enables analysis via maps and graphs. Drawing from multiple data sources, CoopDatum covers cooperation at three levels: regional (with a focus on Minas Gerais), national, and international, providing detailed statistics on Brazil's international cooperation efforts.

From a governmental standpoint, the International Acts Division of the Brazilian Ministry of Foreign Affairs has developed Concordia, system that provides public access to Brazil's collection of international agreements. The platform provides full-text documents along with key metadata, such as the date of signature, countries involved, signatories, and other relevant details. Through a search mechanism, users can look for documents using various parameters, such as agreement title, type of agreement, date, and content of the agreement.

In this landscape, the ENETRIX platform emerges as a prime example of how data science can be applied to international energy cooperation. Developed by the Study Group on Energy Security (GESENE) at the Federal University of Paraíba (UFPB) and supported by CNPQ, ENETRIX serves as a dynamic tool for documenting, analysing, and monitoring Brazil's energy diplomacy using international agreements housed in the Concordia repository managed by the Brazilian Ministry of Foreign Affairs (MRE). The platform's ability to cross-reference metadata based on user-defined queries enables it to deliver a wealth of information through reports, charts, maps, and tables, including comparative analyses across a broad range of agreements.

ENETRIX shares many features with other projects, particularly the International Cooperation Observatory, which aligns most closely with its goals. Both platforms offer graphs, tables, statistics, and insights on international cooperation. However, the Observatory covers a wider array of topics, including foreign trade, public health issues related to pandemics, and diplomacy, with a particular focus on initiatives in the state of Minas Gerais (AMORIM, 2023).

The Energy Security Sentinel report, on the other hand, does not cover international cooperation. Instead, it focuses primarily on the economic dimensions of the energy sector, examining how geopolitical conflicts, natural disasters, and public policies affect commodity supply and pricing. Several techniques and design elements from this report have inspired the development of ENETRIX. Comparing ENETRIX with Concordia, both serve as repositories for international agreement documents. Concordia, however, functions solely as a digital archive. ENETRIX, while also providing a digital archive, specializes in energy-related agreements and provides users with access to a range of statistical analyses and insights related to those agreements (AMORIM, 2023).

This article examines the ENETRIX platform by outlining how it differs from other initiatives, detailing its operational dynamics and exploring its potential value for diplomats, scholars, and civil society. The article is divided into four main sections. The first, 'Digital Diplomacy and Data Diplomacy in a Changing World', explores how digital strategies are shaping international energy cooperation. The second section provides an in-depth look at the technological infrastructure and development strategies behind the ENETRIX platform, shedding light on the processes that contributed to its creation. The third section examines the core components of the online platform. The fourth and final section discusses both current applications and potential future uses of ENETRIX. The concluding remarks the key findings and offer final reflections on the topic.

Digital diplomacy and data diplomacy in a changing world

In the field of international relations, the integration of new technologies by foreign ministries has become increasingly significant. Automation now plays a vital role across various disciplines, including political science, enabling the rapid analysis of large data sets and helping to overcome traditional methodological limitations (SCHROEDER, 2018). Access to data, particularly government data, is vital but often challenging: while much of this information is available online, it is frequently unstructured or not offered in downloadable formats (SILVA and MEIRELES, 2015). Overcoming these obstacles is essential to harness the full potential of information in support of effective international cooperation (SILVA and MEIRELES, 2015).

Robertson (2018) describes the emergence of 'Digital Diplomacy' as a process in which online platforms, such as Twitter and other social networks, are used to extend soft power and streamline communication and strategy within diplomatic organizations. Digital Diplomacy, as defined by Robertson (2018), involves the integration of digital technologies – including IT systems, software, big data, and artificial intelligence – into traditional diplomatic activities such as representation and negotiation.

Data Diplomacy is recognized as a growing field that bridges diplomatic practice with data generation, providing training in the effective use of data to tackle the inherent challenges of international relations. However, Silva and Meireles (2015) identify a major obstacle: converting raw data into actionable knowledge. They emphasize the need for well-organized, easily accessible data – a resource often scarce in politics, where information tends to be disorganized or unavailable for direct download (SILVA and MEIRELES, 2015).

Ashbrook (2020) adds that digital tools can refine diplomatic practice by equipping diplomats to navigate complex, multi-layered negotiations and by improving the forecasting of potential crises. This development underscores the growing relevance of Data Diplomacy, a concept that Ashbrook sees gaining momentum alongside the advancement of digital diplomacy.

Boyd et al. (2019) define Data Diplomacy as the comprehensive interaction between data and diplomatic processes, closely tied to the incorporation of scientific methods within diplomacy. They identify three core dimensions of Data Diplomacy: 'Science in diplomacy', where experts contribute to the diplomatic process; 'Diplomacy for science', which involves leveraging diplomacy to advance scientific research; and 'Science for diplomacy', where scientific cooperation helps forge and strengthen international relationships.

The authors propose defining Data Diplomacy as the strategic use of diplomatic skills and actions by various stakeholders to facilitate and enhance access to, and understanding of, data. This definition encompasses the entire data lifecycle – from its creation to its application and societal impact – highlighting the essential elements of the field. Within this framework, they outline three subcategories of Data Diplomacy: Data in diplomacy (the integration of data or data handling in international relations), Diplomacy for data (global interactions aimed at improving data creation, usage, and interpretation), and Data for diplomacy (the development of platforms that enhance international relationships through data) (BOYD et al., 2019). We argue that the ENETRIX platform embodies all the above subcategories, as we will explain in the next sections.

Data diplomacy tools: what the ENETRIX platform provides

Integrating data science with diplomacy holds significant potential for streamlining international energy cooperation, but doing so requires reliable access to essential data. Governmental repositories of international acts serve as a vital resource in this context, providing public access to pivotal documents for diplomacy and international cooperation. International acts include agreements, treaties, conventions, protocols, declarations, and other instruments that form the legal backbone for regulating relationships between global actors. Thus, providing open access to these documents enhances the capacity for effective collaboration among governments, international organizations, and key global players.

Repositories of international acts are essential to international relations, as these documents form the legal backbone of interactions between nations. Hollis (2020) notes that international treaties are foundational to international law, while Souza (1999) emphasizes that such norms and principles support the very structure of the international system. It is also important to note that other types of documents – such as records, conventions, pacts, declarations, and protocols – carry significant international weight. Though not always legally binding, they represent formal commitments between entities and play a pivotal role in fostering international cooperation (HOLLIS, 2020; SOUZA, 1999).

The global debate on energy reveals a critical gap: despite growing international interest, there is a lack of widespread adoption of Data Diplomacy tools, that facilitate access to visualization of, and analysis of relevant data. This shortfall undermines effective decision-making and hinders sustainable

development in the energy sector – particularly when it involves data derived from diplomatic efforts.

While organizations like the International Energy Agency (IEA) offer valuable databases and annual reports that are essential for energy-related statistics, they have their limitations. For instance, the IEA's energy trade data is limited to its 34 OECD member countries, leaving a considerable gap in global coverage. Establishing an observatory focused on international energy agreements could help bridge these gaps, supporting the implementation and evaluation of related initiatives while revealing current shortcomings in energy diplomacy and cooperation. Brazil's contribution in this area is the Concordia repository, maintained by the Division of International Acts (DAI) within the Ministry of Foreign Affairs, which is responsible for registering and updating the system's data. The use of Concordia underscores both the availability and the potential for integrating similar resources globally, which could greatly expand the reach and depth of research in this field.

International cooperation is essential for ensuring energy security, and platforms like ENETRIX – complemented by other Data Diplomacy initiatives – play a critical role in this process. They offer valuable access to data and analytical tools that help address complex challenges, foster collaboration, support informed decision-making, and drive progress in the energy sector.

In this dynamic context, the ENETRIX platform was developed to improve data management in global energy diplomacy. Created in 2020 by the Energy Security Study Group (Gesene) at the Federal University of Paraíba, with support from CNPq, ENETRIX functions as a sophisticated tool for visualizing data and supporting decision-making in the energy sector. The platform allows users to cross-reference metadata and access detailed information through reports, charts, maps, and tables, highlighting the power of data in shaping energy diplomacy.

This section introduces the ENETRIX platform, emphasizing its technological strengths, design, key features, and the outcomes it has delivered so far. As noted earlier, data serves as the cornerstone of decision-making across various fields, crucial for shaping policies by governments and international organizations and guiding the actions of global players across different sectors. In today's fast-moving information environment, the rapid generation of information calls for closer integration with new technologies, especially to automate data collection and analysis, thus overcoming methodological challenges and enabling the swift processing of large datasets.

This topic is part of a broader research initiative at the Federal University of Paraíba (PIBITI - UFPB), titled 'Modeling and Prototyping of a Web Application for the Registration, Monitoring, and Analysis of Brazil's International Energy Security Agreements (ENETRIX – Energy Treaties Matrix)'. As part of the

project's data collection phase, titled 'Collection and Processing of New Data for ENETRIX', researchers began mapping global governmental repositories of international agreements.

An automated data extraction process was developed for the ENETRIX platform using Python 3.8.10, along with several key libraries, including Selenium 4.7.2, BeautifulSoup 4.11.1, PyAutoGUI 0.9.53, and Pyperclip 1.8.2. Google Chrome version 110.0.5481.178 (64-bit) served as the primary web browser for this operation. A custom Python script was developed to automate data extraction, beginning with a spreadsheet linked to ENETRIX that contained URLs for accessing international agreements on Concordia – Brazil's official repository of international acts. The script used the Selenium library to navigate to each address automatically (SANTOS, 2023).

When accessing the Concordia website, users can retrieve international agreements in both PDF and HTML formats. For this project, the HTML format was preferred due to its ease of data extraction and availability in Brazilian Portuguese. The extraction process involved using the pyautogui and pyperclip libraries to copy text directly from the browser. This content was then cleaned using the BeautifulSoup library, which removed the HTML tags from the extracted content. The resulting text was saved in .txt format. And organized by country, based on the nations that had signed agreements with Brazil (SANTOS, 2023). The use of the Concordia system is justified by the reliability and authority of sourcing data from an official government platform. This approach demonstrates how repositories of international acts can serve as valuable resources for technological innovation. The ENETRIX platform, in particular, showcases the benefits of centralized data in the energy sector by providing dynamic tools for data visualization and analysis.

Following extraction, each agreement was analyzed using the same Python version, enhanced by the Natural Language Toolkit (NLTK) 3.7 and a sentiment analysis model, 'FinBertPTBR: Financial Bert PT BR'. The ENETRIX database now contains 447 international agreements, some of which involve multiple partner countries per document. For example, a single document could encompass agreements between Brazil, Colombia, and Russia. Argentina emerges as a leading partner in energy-related agreements, holding 44 agreements or roughly 09% of all documented cases on the ENETRIX platform (SANTOS, 2023).

The agreements span a range of energy resources, with renewable energy representing the largest share at 14.2%, followed closely by electricity at 12.4%. The database organizes these agreements into four main energy categories, as shown in Table 01.

Table 01. Classification of agreements in ENETRIX by Energy Type

Rank	Name	Number of agreements	Percentage of total
01	Renewable	174	38.9%
02	Unspecified	123	27.5%
03	Non-renewable	86	19.2%
04	Mixed	64	14.3%

Source: Based on ENETRIX (2023).

The development of the ENETRIX web application was carried out with support from the Department of Computer Engineering at UFPB, which assisted in creating a minimum viable product. Once the platform's framework was established, it began providing users with vital information through dynamic visualizations that illustrate data trends over time, across different Brazilian presidential administrations, and among various document types. This functionality demonstrates the platform's comprehensive capabilities, now fully realized in its current iteration.

An overview of the ENETRIX online platform

ENETRIX offers a versatile set of analytical tools that enable the exploration of partnerships, energy matrices and resources, government involvement, and document content— all within the scope of Foreign Policy Analysis. The platform is especially valuable for understanding Brazil's energy diplomacy by identifying key international partners and mapping the geographic focus of these relationships, thereby providing richer insights into both bilateral and regional dynamics.

The Home screen provides a comprehensive overview of key statistics related to Brazil's international energy agreements. As shown in Figure 01, users can access a range of statistical data, including: 01. the total number of international agreements with Brazil as a signatory; 02. a list of Brazil's top partners in the energy sector; 03. a breakdown of the most frequently utilized energy resources within these agreements; and 04. a categorization of agreements by energy matrix type (AMORIM, 2023).

The platform uses the template's table component to present various rankings to users. The react-chartjs-2 library offers a suite of customizable data visualization tools, including line and bar charts. Available data visualizations include: 01. a line chart depicting the annual trend in agreements signed; 02. a bar chart showing the number of agreements concluded during each presidential term; and 01. a bar chart categorizing agreements by document type (AMORIM, 2023).

Figure 01. ENETRIX Brazil Platform Home screen

Source: Elaborated by the based on ENETRIX (2023).
Note: Home screen presenting an overview of Brazilian agreement statistics. Available at <http://enetrix.ufpb.br/#/home>.

The Map page (Figure 02) provides a geographic overview of agreement data. Using the react-simple-maps library, built on d3-geo, the platform generates detailed maps with markers, lines, annotations, and more. Color coding visually illustrates the global distribution of agreements. Users can search for a country or select one directly on the map, which then takes them to a document search page. There, they can view a list of agreements associated with that country, along with relevant statistics (AMORIM, 2023).

Figure 02. ENETRIX Brazil Platform Map page

Source: Elaborated by the based on ENETRIX (2023).
Note: Map visualization. The shades of blue indicate the number of agreements each country has signed with Brazil, while Brazil itself is highlighted in red. Available at <https://enetrix.ufpb.br/#/map>.

Discussion

The ENETRIX platform provides a detailed analysis of the types of energy matrices and resources featured in international agreements, categorizing them as renewable, non-renewable, mixed, or unspecified. It highlights which energy resources – such as biofuel, natural gas, and nuclear energy – are most frequently prioritized and attract significant investment. This functionality is essential for tracking shifts in Brazil's energy profile over time and for assessing broader trends and developments in international energy policy.

ENETRIX also supports the advancement of Sustainable Development Goal (SDG) 07, particularly target 7.a, which aims by 2030 to "enhance international cooperation to facilitate access to clean energy research and technologies, including renewable energy, energy efficiency, and advanced and cleaner fossil fuel technologies, and promote investment in energy infrastructure and clean energy technologies" (ONU, 2018).

This capability aligns with the objectives of the 2030 Agenda for Sustainable Development, notably SDG 17, which emphasizes the importance of strengthening global partnership. Target 17.6 calls for enhanced international cooperation and improved access to science, technology, and innovation, fostering knowledge sharing under mutually agreed terms through mechanisms like the UN's global technology facilitation (ONU, 2018). Additionally, Target 17.16 highlights the need to strengthen partnerships for sustainable development through multi-stakeholder collaboration, mobilizing and sharing resources, expertise, and knowledge to advance the Sustainable Development Goals, especially in developing countries (ONU, 2018).

These functionalities enhance the platform's capacity to track progress on initiatives related to the 2030 Agenda, ensuring that ENETRIX is effectively aligned with the UN Sustainable Development Goals. Notably, renewable energy sources represent 38.9% of all agreements cataloged on the platform, enabling users to pinpoint the most commonly addressed resources and prioritize policies for their growth and expansion, both domestically and globally.

Additionally, the platform includes monitoring mechanisms essential for assessing the effectiveness of public policies at both national and international levels. As Minillo and Lima (2019, p. 269-286) emphasize, "It is crucial to develop monitoring and impact assessment instruments for policies, allowing for their reinforcement, modification, or termination based on their outcomes, particularly considering the dynamic nature of the international arena and the varying national contexts".

The relevance of analysing leadership within the framework of Foreign Policy Analysis has been both contested and reaffirmed over time. Hudson (2014) advocates for a structured approach, arguing that examining leadership behavior can significantly elucidate various aspects of international relations, thereby enriching the academic debate on Brazilian Foreign Policy (HUDSON, 2014). This perspective underscores the strategic role of ENETRIX in delivering a data-driven, historically informed overview of the energy diplomacy landscape.

ENETRIX enables the analysis and comparison of Brazil's energy diplomacy across different presidential administrations. Providing, insights into the number of diplomatic agreements and how various leaders have approached energy diplomacy. This analytical capability is invaluable for gauging the consistency or evolution of strategies and priorities over time. For instance, Argentina is a key partner in Brazil's energy sector, with 44 international agreements signed since 1990. This data allows policymakers at all levels to develop strategies that build on this long-standing partnership, such as launching joint initiatives. Moreover, this partnership model could serve as a blueprint for fostering similar cooperation within other regions – such as within the Community of Portuguese Language Countries (CPLP) – by leveraging existing agreements to advance energy diplomacy.

The ENETRIX platform offers a detailed analysis of the various types of documents used in Brazil's energy diplomacy, such as treaties, agreements, memoranda of understanding, and joint declarations. It reveals how frequently each document type is utilized, shedding light on the formal structure and strength of Brazil's international energy partnerships. This analysis is particularly useful for understanding the strength and depth of these collaborations and serves as a valuable resource for studying energy cooperation from the perspective of International Law.

Notably, the number of energy-related documents available on ENETRIX already surpasses the total number of treaties involving Brazil listed in the UN Treaty Collection, which includes 361 treaties across various topics. Having access to a broader range of documents beyond formal international treaties is vital for advancing international energy cooperation, as it offers a fuller picture of the commitments and actions taken by countries within the energy sector. This comprehensive approach promotes greater transparency and adaptability, allowing for a deeper understanding of cooperation dynamics over time. By including various types of international acts, ENETRIX not only fosters openness but also supports the effective implementation of agreements, fostering mutual trust and collaboration toward a sustainable energy future.

Final considerations

Overall, ENETRIX serves as an invaluable resource for dissecting Brazilian energy diplomacy, offering deeper insights into international partnerships, energy matrices, key resources, governmental actors, and the types of documentation involved. These analyses furnish critical information for informed decision-making, strategic planning, and crafting effective energy policies that align with Brazil's international objectives. Moreover, ENETRIX is designed to meet the needs of a broad audience – including researchers, academic institutions, private companies, government agencies, and diplomatic organizations – making it a versatile platform with wide-ranging applications.

As an ongoing scientific and technological initiative, ENETRIX has successfully built a robust and reliable database, housing detailed records of 447 international energy acts spanning from 1990 to 2022. The platform not only provides easy access to these documents but also offers powerful tools for data visualization and efficient searching, significantly advancing research in International Relations. ENETRIX has already contributed to numerous academic works, including master's and doctoral theses, and has garnered recognition at scholarly conferences and in academic publications.

Addressing energy issues within the realm of international relations demands extensive multidisciplinary collaboration due to the field's complexity and interconnected impact on society and the global landscape. On this note, issues like energy security, the shift towards renewable energy sources, international cooperation, and energy diplomacy demand thorough, multi-layered analysis. This holistic approach aids in unravelling the intricate interplay between energy, politics, economy, environment, and society, paving the way for integrated solutions to global energy challenges and the pursuit of technological innovations. Enter the ENETRIX platform – a scientific and technological venture poised to revolutionize energy cooperation and development. Positioned at the intersection of sustainability and efficiency, ENETRIX offers a novel approach to fostering collaborative solutions in the energy sector.

Since its inception, the ENETRIX platform has embodied the integration of science and diplomacy as described by Boyd et al. (2019). Drawing inspiration from the subcategories of Data Diplomacy proposed by the authors, ENETRIX harnesses data from international energy acts to facilitate collaboration between national and international stakeholders, exemplifying the powerful synergy between international relations and computer engineering in its design and development.

Crucially, ENETRIX aligns with the objectives of the 2030 Agenda, serving as a powerful tool for data diplomacy, advancing energy cooperation, and supporting the formulation and implementation of policies aimed at achieving the UN's Sustainable Development Goals. This article highlights ENETRIX's potential as a game-changing resource in international energy relations. Its capacity to access, analyze, and visualize international energy data encourages dialogue and information sharing among diverse stakeholders, helping to overcome common barriers related to data accessibility and interpretation.

Nevertheless, ENETRIX should be regarded as part of a broader strategy to advance international energy cooperation, complementing multidisciplinary approaches, diplomatic negotiations, and political dialogue. While it cannot address every challenge on its own, integrating the platform with other initiatives can lead to more sustainable and effective results. Building on these findings, it is recommended to incorporate ENETRIX and similar data diplomacy tools into cooperation frameworks and research endeavours. Moreover, fostering partnerships and collaborations will be crucial to enhancing the platform's functionality and expanding its database.

All in all, this research underscores ENETRIX's potential as a pivotal tool for data diplomacy in international renewable energy cooperation. The findings presented here are intended to encourage and catalyse further advancements in this innovative approach, helping to shape a more sustainable and cooperative energy future.

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Referências

AMORIM, Tiago Tito Gomes (2023), Desenvolvimento de uma ferramenta front end para visualização de dados sobre acordos de energia no Brasil. *Undergraduate course completion work*. Departamento de Ciência da Computação. Universidade Federal da Paraíba.

ASHBROOK, Cathryn Cluver (2020), From digital diplomacy to data diplomacy. Belfer Center for Science and International Affairs. Available at <https://www.globalissues.org/news/2020/01/20/26017>. Accessed on May, 15, 2024.

BOYD, Andy; GATEWOOD, Jane; THORSON, Stuart, and, DYE, Timothy De Ver (2019), Data diplomacy. *Science & Diplomacy*. Vol. 08, N° 01, pp. 01-15.

CONNELLY, Matthew J.; HICKS, Raymond; JERVIS, Robert; SPIRLING Arthur, and SUONG, Clara H. (2021), Diplomatic documents data for international relations: the Freedom of Information Archive Database. *Conflict Management and Peace Science*. Vol. 38, N° 06, pp. 762-781.

ENETRIX (2023), Enetrix: energy, treaties, matrix. Available at <https://enetrix.ufpb.br/pt>. Accessed on May 15, 2024.

FATTOUH, Bassam and MAHADEVA, Lavan (2013), OPEC: What difference has it made? *Annual Review of Resource Economics*. Vol. 05, N° 01, pp. 427-443.

GRIFFITHS, Steven (2019), Energy diplomacy in a time of energy transition. *Energy Strategy Reviews*. Vol. 26, pp. 01-10.

HUDSON, Valerie M. (2014), *Foreign policy analysis: classic and contemporary theory*. Lanham: Rowman & Littlefield. 225 pp..

HOLLIS, Duncan B. (ed) (2020), Defining treaties. In: *The Oxford Guide to Treaties*. Oxford: Oxford University Press. pp. 11-45.

KUZEMKO, Caroline; LAWRENCE, Andrew, and WATSON, Matthew (2019), New directions in the international political economy of energy. *Review of International Political Economy*. Vol. 26, N° 01, pp. 01-24.

MINILLO, Xaman Korai Pinheiro and LIMA, Marne Thereza de Liseux Silva e (2019), Fortalecer os meios de implementação e revitalizar a parceria global para o desenvolvimento sustentável. In: *Os objetivos de desenvolvimento sustentável e as relações internacionais*. Edited by MENEZES, Henrique Zeferino de. João Pessoa: Editora UFPB. pp. 269-286.

ONU (2018), Transformando nosso mundo: a agenda 2030 para o Desenvolvimento Sustentável. *Ambient Sustent*. Vol. 25, N° 01, pp. 171-190.

OVERLAND, Indra (2019), The geopolitics of renewable energy: debunking four emerging myths. *Energy Research & Social Science*. Vol. 49, pp. 36-40.

O'SULLIVAN, Meghan; OVERLAND, Indra, and SANDALOW, David (2017), The geopolitics of renewable energy. *HKS Working Paper*. N°. RWP17-027.

PAIVA, Iure (2019), ODS 7 - Assegurar o acesso confiável, sustentável, moderno e a preço acessível à energia para todas e todos. In: *Os objetivos de desenvolvimento sustentável e as relações internacionais*. Edited by MENEZES, Henrique Zeferino de. João Pessoa: Editora UFPB. pp. 139–153.

ROBERTSON, Jeffrey. Organizational culture and public diplomacy in the digital sphere: The case of South Korea. *Asia & the Pacific Policy Studies*. Vol. 05, N° 03, pp. 672-682.

SANTOS, Ewerton do Nascimento (2023), *Análise de sentimentos em acordos internacionais de cooperação energética*. *Undergraduate course completion work*. Departamento de Ciência da Computação. Universidade Federal da Paraíba.

SCHOLTEN, Daniel (ed) (2018), *The geopolitics of renewables*. Cham: Springer International Publishing. 359 pp..

SCHROEDER, Ralph (2018), Big data: moldando o conhecimento, moldando a vida cotidiana. *MATRIZes*. Vol. 12, N° 02, pp. 135-163.

SILVA, Denisson and MEIRELES, Fernando (2015), Ciência Política na era do Big Data: automação na coleta de dados digitais. *Revista Política Hoje*. Vol. 24, N° 02, pp. 87-102.

SOUZA, Ielbo Marcos Lobo de (1999), A natureza e eficácia do direito internacional. *Revista de informação legislativa*. Vol. 36, N° 141, pp. 217-227.

SOVACOOL, Benjamin K. (2016), How long will it take? Conceptualizing the temporal dynamics of energy transitions. *Energy Research & Social Science*. Vol. 13, pp. 202-215.

THE ECONOMIST (2018), Clean power is shaking up the global geopolitics of energy. The Economist. March 15, 2018. Available at <https://energy.mit.edu/news/clean-power-is-shaking-up-the-global-geopolitics-of-energy/. Accessed on May 15, 2024.