

UNIVERSITY OF PIRAEUS

ENERGY TRANSITION AND ENERGY DEMOCRACY

**A THESIS SUBMITTED TO THE
DEPARTMENT OF INTERNATIONAL AND EUROPEAN STUDIES**

IN PARTIAL FULFILLMENT OF THE REQUIREMENTS

**for the Master's Degree of
ENERGY: STRATEGY, LAW & ECONOMICS**

Oikonomou Alexandros-Spyridon

Piraeus

June 2022

Ο Οικονόμου Αλέξανδρος βεβαιώνω ότι το έργο που εκπονήθηκε και παρουσιάζεται στην υποβαλλόμενη διπλωματική εργασία είναι αποκλειστικά ατομικό δικό μου. Όποιες πληροφορίες και υλικό που περιέχονται έχουν αντληθεί από άλλες πηγές, έχουν καταλλήλως αναφερθεί στην παρούσα διπλωματική εργασία. Επιπλέον τελώ εν γνώσει ότι σε περίπτωση διαπίστωσης ότι δεν συντρέχουν όσα βεβαιώνονται από μέρους μου, μου αφαιρείται ανά πάσα στιγμή αμέσως ο τίτλος.

Υπογραφή

A handwritten signature in black ink, consisting of a stylized capital letter 'Α' followed by a horizontal line that ends in a small flourish.

Acknowledgements

First and foremost, I would like to express my deepest gratitude to the supervisor of my thesis DR. John Paravantis who, through his guidance, spirit of research and teaching, motivated in pursuing the chosen topics of “energy transition” and “energy democracy”. I would like to thank Professors Nikolaos Farantouris and Spyridon Roukanas as the Professors’ Committee and for allowing me to work on the topics I chose and for every valuable input and information they provided throughout their lectures and in my studies overall.

Additionally, I would like to take this chance and also thank the University’s Department of International and European Studies which provided everything necessary to be able and complete this work, every valuable resource and material needed, allowing me to develop my skills in scientific research and broaden my academic horizons.

I would also like to extend my sincere thanks to my family for the constant motivation and support they provided and specifically my father and brother for not only the mental but practical support they provided, all the conversation and valuable remarks.

Table of Contents

Acknowledgments	3
Table of Contents	4
List of Tables	5
List of Figures	6
Chapter 1: Introduction	7
1.1 Preamble	7
1.2 Structure of the Thesis	8
Chapter 2: Literature Review	10
2.1 Energy democracy	10
2.2 Energy transition	17
2.3 Relations between democracy and energy	27
2.4 Discussion.....	34
Chapter 3: Case studies	36
3.1 The paradox of the Chinese energy revolution	36
3.1 Energy transition in the USA	42
3.3 Towards energy democracy: The case of Bhutan	47
3.4 Discussion.....	50
Chapter 4: Conclusion	54
4.1 Summary	54
4.2 Concluding remarks	57
References	59

List of Tables

Table 1. A synopsis of the literature and definitions of energy democracy	16
Table 2. A synopsis of the literature and definitions of energy transition defined.	Error! Bookmark not defined.
Table 3. Renewable energy investments of China and the US for 2020	53

List of Figures

Figure 1. Four potential energy futures	25
Figure 2. Energy consumption in the United States (1776-2014)	43
Figure 3. Schematic depiction of hydraulic fracking	46
Figure 4. U.S. primary energy consumption by energy source (2021)	47

Chapter 1: Introduction

1.1 Preamble

It is evident that, in the most recent years, ideas and concepts of energy, politics, and the environment have been at the forefront of both political and academic agendas. Inherently, the dominant fossil fuel system reproduces inequality. This is because naturally there is an unequal distribution of fossil fuels across the globe. Countries that have control of territories with natural resources and fossil fuels are privileged in comparison to countries with no resources. The issues that have risen caused by the functions and practices of the energy sector have increasingly received more and more attention as societies have hit a roadblock to providing a secure and sustainable economic and social development to the people.

Rising costs of energy, the adverse effects of climate change and secure supplies of energy are some examples of the more contemporary problems that exist.¹ The structure of the energy market, being characterized by state and corporate capitalism, has shaped our approach and understanding on how energy should be understood and treated. Modes of production and distribution of energy have been set as such to promote the interest of a few powerful nations, big corporations and organizations that produce and distribute energy.²

On the other hand, the application of state capitalism endorses the state to control the free market in order to maintain the already existing political regime. This control of the market allows the state to gain more power and wealth to secure its sovereignty. The outcome of the accumulation of wealth has led to states creating centralized national corporations that exercise control over natural energy resources and dictate their allocation.³ Thus, reassuring the sovereignty of the state.

In addition, the nature of capitalism, state or private, has created the perception of energy being a commodity just like all others, used to generate profit. Because of the aforementioned emerging problems, activists first, politicians and scholars began arguing in favor of the idea of energy democracy.⁴ Although the idea of energy democracy is ill-defined, the fundamental argumentation is that the energy sector requires a transition in its perception and functions.

¹ Sweidan, O.D. (2021). State capitalism and energy democracy. Geoforum. <https://www.sciencedirect.com/science/article/pii/S001671852100107X>

² Ibid

³ Ibid

⁴ Szulecki, K. & Overland, I., 2020. Energy democracy as a process, an outcome and a goal: A conceptual review. Energy Research & Social Science. Available at:

Energy democracy tries to combine democratic and social elements in the energy sector and energy policies.⁵ Amongst the different iterations of energy democracy, a great focus is given to the means of production, distribution and consumption. Regardless, the goal of my literature review is to explore the writings on the definition of energy democracy and explore the concept of energy transition, which represents the fundamental change in society's approach on energy and the energy sector as a whole.

The potential to achieve such forms of societal organization can be understood through the lens of the energy transition. Energy transition presents a path towards a fundamental paradigm shift regarding the existing energy sector and its practices. Mainly, advocating for transitioning from the dominant fossil fuel energy system and moving towards more sustainable forms of energy to reduce excessive carbon emissions and consequently provide an environmentally sustainable and secure energy supply and affordable to the public. Thus, creating an energy mix with an increasing contribution of environmentally friendly, renewable and more sustainable sources of energy. The idea is to reduce carbon emissions and achieve an environmentally sustainable and secure energy supply. It remains to make this transition affordable to the public and this is exactly the point where the issue of energy democracy has a predominant importance.

1.2 Structure of the thesis

I shall begin my analysis by providing a review of the literature that has been concerned with the ideas of energy democracy and energy transition. I will then try to map out certain relations bounding those two ideas. While on the chapter after, I provide two case studies, the first being that of China and its energy plans and ambitions and the second one is the intriguing case of Bhutan. I examine China's attempt to shift towards more environmentally-friendly practices, cutting down coal usage and subsequently carbon emissions whilst being the country with the biggest economic and industrial development in the past few decades. This case presents a reality in which there is a major paradox between economic and industrial growth and the deployment of policies and regulations that try to tackle the excess carbon emissions and introduce more environmentally friendly practices. The second case study I present in this paper is that of Bhutan, as said. This is because Bhutan represents

<https://www.sciencedirect.com/science/article/pii/S2214629620303431>. [Accessed April 7, 2022]. [Accessed 23 Oct. 2020].

⁵ Szulecki, K. & Overland, I., 2020. Energy democracy as a process, an outcome and a goal: A conceptual review. *Energy Research & Social Science*. Available at: <https://www.sciencedirect.com/science/article/pii/S2214629620303431>. [Accessed April 7, 2022]. [Accessed 23 Oct. 2020].

a case of what an alternative approach to energy democracy could “look like”. As Bhutan is the world’s first carbon negative country and has transitioned to democracy just this century, this case provides good insights of how a political transition to democracy along with political provisions and practices of environmental preservation could harmoniously coexist to create this intriguing form of societal organization.

Chapter 2: Literature Review

2.1 Energy democracy

As previously stated, in recent years, the relation between the terms “energy” and “democracy” is increasingly receiving more attention. Emerging problems such as climate change and unequal access and distribution to energy and resources have given birth to the idea of “energy democracy”. The first thing to be noted is, that until now, the concept of energy democracy has been ill-defined as there has not been an accepted universal understanding. Kacper Szulecki and Indra Overland, two Norwegian professors, in their writings tried to provide an adequate approach to understanding and defining the idea of energy democracy. To be more precise, the professors begin their work by identifying the reasons which drive the emergence of energy democracy. Those reasons are climate change, market changes and technological progress⁶. As stated, no universal understanding of energy democracy exists. But the authors identify certain consistent elements within the concept as many of its different iterations are focused on matters such as who is in control of the means of energy production, distribution and consumption⁷.

Because of this fragmentation of literature on energy democracy the professors provide their three-level definition. Firstly, they define the idea of energy democracy as a process.⁸ They perceive this idea as a social movement that drives this dynamic process forward.⁹ This social movement promotes renewable sources of energy while going against the already existing energy systems of fossil fuels and other unsustainable forms of energy.¹⁰

This dynamic process is what causes the idea of energy democracy to be ill-defined. As the idea is defined by the variables of present ongoing practices of society and technology, it is evident that the understanding of energy democracy is restructuring itself depending on these variables. But the goal of this movement fundamentally remains the same. That being “*efforts to resist, reclaim and restructure the existing energy systems*”.¹¹ This driving social movement enables the spread of the

⁶ Ibid

⁷ Ibid

⁸ Szulecki, K. & Overland, I., 2020. Energy democracy as a process, an outcome and a goal: A conceptual review. *Energy Research & Social Science*. Available at: <https://www.sciencedirect.com/science/article/pii/S2214629620303431>. [Accessed April 7, 2022]. [Accessed 23 Oct. 2020].

⁹ Ibid

¹⁰ Ibid

¹¹ Ibid

idea in many different aspects within society such as worker unions, activists, academics and scholars and politicians.

The second level of understanding of energy democracy is that of the outcome of decarbonization.¹² The authors claim that as society drifts away from fossil fuel energy to less carbon intensive energy and renewable sources the energy sector will flourish alongside principles of democracy and sustainable development.¹³ Energy democracy will be achieved as an outcome of social and technical elements. The gradual change from fossil fuels to lower-carbon energy sources is the reason that will allow energy democracy to emerge.

Based on this level of understanding of energy democracy, the authors claim that the transition required, begins with technological progression and innovation.¹⁴ Social and political change are next to follow.¹⁵ From this, we can understand that the direction of the transition will be set by technological innovations and political practices.

The last framework of understanding energy democracy, according to Szulecki and Overland, is in terms of being a goal. A goal in which communities and societies can aspire and set to achieve.¹⁶ Focused on this understanding of the idea, transitioning to Energy Democracy cannot be solely achieved via technological means but requires the politicization and democratization of the energy sector and market. The authors state that, based on this understanding, most scholars and politicians support the evaluation of how democratic the practices of the energy sector are based on a set benchmark. With this, societies can evaluate themselves in terms of how close they are in achieving their goals.¹⁷ *“Energy democracy supports a wide spread participation and inclusion of informed, aware and responsible political subjects”*.¹⁸ Additionally these political subjects are engaged in the process of decision making concerning the decisions that pertain to the energy sector. With this level of understanding of energy democracy, it is evident that the energy sector needs to be politicized to trigger the transition. More specifically, democratic fundamentals need to be reintroduced in the energy sector practices.

¹² Ibid

¹³ Ibid

¹⁴ Ibid

¹⁵ Ibid

¹⁶ Ibid

¹⁷ Ibid

¹⁸ Ibid

Szulecki in another writing of his, 'Conceptualizing energy democracy', urges the reader to try and also understand energy democracy as a set of ideal political goals.¹⁹ Which will allow the public to be the recipient, stakeholder and also the account holders of the energy sector as a whole. Other defining elements of the idea are wide inclusion and participation in the energy sector, a transparent system of decision-making but also informed and aware political subjects which will be able to treat energy sources as a public good.²⁰ Szulecki also makes a mention of the idea of "energy justice", as introduced by Sovacool and Dworkin, as a conceptual tool of energy democracy. Sovacool and Dworkin's idea is described in three premises. The first one is democratic popular sovereignty, participatory governance and civic ownership. Those democratic ideals, Szulecki supports to be of paramount importance, tying the concepts of democracy and energy together.

Burke and Stephens in their writings on the idea of energy democracy do try to define energy democracy by using the slogan, adopted by activist groups, "resist-reclaim-restructure".²¹ The essence of this slogan is to "resist the agenda of big fossil fuel corporations, the need to reclaim the energy sector to the public sphere and restructure energy world energy systems in order to scale up renewable energy and other low carbon options".²² To further try and explain the idea, the authors try to provide an assessment of the goals of energy democracy. Which goals are viewed through the lens of the slogan mentioned above "resist-reclaim-restructure"? More specifically, in the context of resisting the dominant existing agenda of the big energy corporation, energy democracy supports the shift from fossil fuel-based energy to renewable and sustainable forms of energy²³. Meaning to stop investing and expanding in such infrastructure and technology. Stop the privatization that is evident in the energy sector and prevent the undermining of environmental protection.²⁴

In the context of reclaiming the energy sector, the idea of energy democracy supports the localization of energy corporations, the public control of energy production and consumption and public interest to be the main driver of activity within the sector.²⁵ Lastly, in the context of

¹⁹ Szulecki, K., 2017. Conceptualizing energy democracy. Environmental Politics. Available at: <https://www.duo.uio.no/handle/10852/62331?show=full> [Accessed April 7, 2022].4.

²⁰ Ibid.

²¹ J. Burke, M. & Stephens, J., 2017. Energy democracy: Goals and policy instruments for Sociotechnical transitions. Energy Research; Social Science. Available at: <https://reader.elsevier.com/reader/sd/pii/S2214629617303031?token=> [Accessed April 7, 2022].

²² Sweeny, S., Resist reclaim restructure. Rosa Luxemburg Stiftung. Available at: https://www.rosalux.de/fileadmin/rls_uploads/pdfs/engl/resistreclaimrestructure_en_2013.pdf [Accessed April 7, 2022].

²³ Burke, M. & Stephens, J., 2017. Energy democracy: Goals and policy instruments for Sociotechnical transitions. Energy Research; Social Science. Available at: <https://reader.elsevier.com/reader/sd/pii/S2214629617303031?token=> [Accessed April 7, 2022].

²⁴ Ibid

²⁵ Ibid

restructuring the energy sector, energy systems should be regarded and governed as a commons, shared access on energy assets and to be broadly shared within communities, shifting the focus from profit and growth to sustainability, wellbeing and the environment.²⁶ Additionally, energy democracy supports the cooperation between nations over competition and conflict and the decentralization and distribution of the existing political and economic power within society.²⁷ After having discussed the set of goals of energy democracy, according to the authors, they move on to discuss certain policy instruments that could be of use for transitioning to energy democracy.

Kunze and Becker, in their writing, “Energy democracy in Europe” have also tried to add to the already existing literature on energy democracy by offering their understanding. The authors, who draw elements from different interpretations of energy democracy made by different activist groups, define energy democracy on the premises of democratization, property, surplus value production and ecology.²⁸ More precisely, in regards to democratization, the authors argue for inclusion and participation of the public in the decision-making process on choices regarding energy, such as energy projects for example.²⁹

In terms of property, there needs to be a shift from the privatized and apolitical forms of property to a deeply politicized and accessible by the public. Moving from state ownership to municipal or collective private ownership.³⁰ In terms of surplus-value production, the authors argue that, by making a shift from fossil fuels to renewable forms of energy there will be created a “local surplus value production”. This is because, while considering the production of fossil fuels, we can understand that there is a constant flow of capital in order to produce or pay for the imported energy.³¹ Whereas, if we consider renewables as an example, a wind turbine or a solar panel need to be purchased and installed, but after the initial investment, there is no need for any other big expenses as the wind does not stop “blowing” or the sun does not stop shining. Thus, generating energy with minimal costs. Lastly, on the premise of ecology and sufficiency, energy democracy attempts to shift the fundamental approach of society to the capitalist market structure, in the sense that economic

²⁶ Ibid

²⁷ Ibid

²⁸ Kunze, C. & Becker, S., 2015. Energy Democracy in Europe. Available at: <https://www.rosalux.de/en/publication/id/7969/energy-democracy-in-europe/>. [Accessed April 7, 2022].

²⁹ Ibid

³⁰ Ibid

³¹ Ibid

growth often enough comes at the expense of the people and the planet.³² By consuming less energy and becoming more efficient we can achieve more sustainable development.

Wahlund and Palm, in their work, attempted to define and explore the concept of energy democracy. Their definition is derived by comparing the term with another term, that being, energy citizenship, which I will be discussing further down my writing.³³ This is being done because of the tight knight relation between energy democracy and energy citizenship and often enough both terms are being utilized under the same meaning. That is why the authors attempt to give a more distinct and clear definition of energy democracy. To be more specific, energy democracy is understood as a politically oriented concept in contrast to energy citizenship, which leans towards a more academic concept, focusing mainly on the individual energy consumer and his agency within the market.³⁴ According to these authors, energy democracy opts for a more “*participatory form of energy provision and governance*”³⁵. That would include energy generation and production but also distribution. This conceptualization also can be understood as a counter response to the already existing centralized energy regimes.³⁶

Energy democracy is also characterized as an emerging social movement with roots advocating for a fundamental political and infrastructural change. A change towards democratizing the decision-making process of the energy sector and the means of ownership shifting to a greater community ownership, moving away from the already mentioned centralized form of structure. Individual consumers could now be perceived as “*prosumers*”³⁷. Meaning, that consumers have the ability to critically assess the market, to design and innovate and be involved with the whole market chain. Important to make a mention of, is the fact that the authors do understand energy democracy as an ideal political goal to empower the position of consumers and communities within our existing centralized energy sector.³⁸

³² J. Burke, M. & C. Stephens, J., 2017. Energy democracy: Goals and policy instruments for Sociotechnical transitions. Energy Research; Social Science. Available at: <https://reader.elsevier.com/reader/sd/pii/S2214629617303031?token=> [Accessed April 7, 2022].

³³ Wahlund, M. & Palm, J., 2022. The role of Energy Democracy and energy citizenship for Participatory Energy Transitions: A comprehensive review. Energy Research & Social Science. Available at: <https://www.sciencedirect.com/science/article/pii/S2214629621005697> [Accessed April 7, 2022].

³⁴ Ibid

³⁵ Ibid

³⁶ Ibid

³⁷ Ibid

³⁸ Wahlund, M. & Palm, J., 2022. The role of Energy Democracy and energy citizenship for Participatory Energy Transitions: A comprehensive review. Energy Research & Social Science. Available at: <https://www.sciencedirect.com/science/article/pii/S2214629621005697> [Accessed April 7, 2022].

Contributing to the literature of energy democracy, van Veelen and van der Horst, in their work, examine the term by focusing on four different dimensions. Those would be the aims of energy democracy, namely the actors and those who get affected, the manifesting material dimensions and its territorial dimensions, concerning the scale and territory.³⁹ To begin with, the authors are concerned with the different sets of aims energy democracy is trying to achieve. The concept can be framed as the response to the existing centralized regime that governs most parts of the Western energy sector. It attempts to deal with limitations seen in the domain of ownership and control of energy resources and distribution grids.⁴⁰ But the question remains whether energy democracy is the outcome or the process. Does it represent an ideal future that has the potential to be achieved or the ongoing process and struggle that must be faced in order to achieve a decentralized, equitable and inclusive energy sector? On a large scale, the existing literature suggests that energy democracy serves as a blueprint to a fundamental restructuring of the energy sector in regards to equity and ownership.⁴¹ But by extension, the practices that create such an environment of decentralization and equitable ownership, reinforce the conditions needed to achieve energy democracy. Thus, it can be said that energy democracy has both elements that constitute the concept both as an outcome and also as a process.

The second dimension of energy democracy being examined by van Veelen and van der Horst is the actors.⁴² Meaning both those who are actively involved in the decision-making process and those who are affected by those decisions. The authors identify the importance of strong and direct participation of the highest possible number of people. Each individual ought to participate in the politics of energy but not only as a consumer. Individuals can now take the role of owner, distributor and producer. They become energy citizens by being active and participating in the field of energy.⁴³

The third dimension being discussed by the authors is the material dimension.⁴⁴ The premise here is that with the development of new technologies and possibilities can provide grounds to which citizens can participate in energy decision-making.⁴⁵ An example of that would be the potential

³⁹ Veelen, B.van & Horst, D.van der, 2018. What is energy democracy? connecting social science, energy research and political theory. *Energy Research & Social Science*. Available at: <https://www.sciencedirect.com/science/article/pii/S2214629618306261> [Accessed April 7, 2022].

⁴⁰ Ibid

⁴¹ Ibid

⁴² Ibid

⁴³ Ibid

⁴⁴ Ibid

⁴⁵ Ibid

participation through investments in these new technologies or the ability to generate energy, thus increasing the agency of each citizen within the market.

The fourth and last dimension addressed by van Veelen and van der Horst is that of territory and scale. It can be observed that the ‘local’ dimension of territory is key for energy democracy.⁴⁶ As it argues for the localization of ownership for a more democratized energy sector. This way communities could be empowered by reducing their dependency on third parties to provide them with sufficient amounts of energy. Although the question of what is the most just territorial management still exists. A big counterexample to localization is ‘Trade Unions for Energy Democracy’ (TUED). TUED represents an international program that supports local communities in their generation and management of energy. International bodies such as this can also provide grounds in which democracy can infiltrate the energy sector. Whether local or global, the fundamental point of decentralization still stands, as we can understand from the above.

From the reviewed literature above, we can identify some basic pillars that define the idea of energy democracy, as they appear to be evident in the writings. Democratization of energy resources and decentralization of the energy market, transition from a fossil fuel-based market to a decarbonized one and to tackle man-driven climate change. Below I have included a table that summarizes the information given above according to each author.

Table 1. A synopsis of the literature and definitions of energy democracy

Authors	Energy democracy
Szulecki & Overland	<ul style="list-style-type: none"> - Energy Democracy as a process of resisting, reclaiming, restructuring - Energy Democracy as an outcome of decarbonization - Energy democracy as a goal aspiring to achieve
Burke & Stephans	<ul style="list-style-type: none"> - Resist the agenda of big fossil fuel corporations, - Reclaim the energy sector to the public sphere - Restructure energy world energy systems to scale up renewable energy and other low carbon options
Kunze & Becker	<ul style="list-style-type: none"> - Shift to a politicized and accessible by the public form of property and resource ownership - Create local surplus-value by shifting from fossil fuels

⁴⁶ Ibid

<p style="text-align: center;">Wahlund & Palm</p>	<ul style="list-style-type: none"> - Politically oriented concept, focusing on the individual energy consumer and his agency within the market. - A more “participatory form of energy provision and governance
<p style="text-align: center;">van Veelen & van der Horst</p>	<ul style="list-style-type: none"> - Defined energy democracy in four dimensions: aims of energy democracy, the actors and those who get affected, the manifesting material dimensions and its territorial dimensions, concerning the scale and territory

2.2 Energy transition

The idea of “energy transition” has also been at the forefront when conceptualizing energy democracy. This idea represents a complex but fundamental shift in society’s approach toward energy resources and the energy market. According to IRENA (International Renewable Energy Agency) energy transition can be characterized as “*a pathway toward transformation of the global energy sector from fossil fuel-based to zero-carbon by the second half of the century*”⁴⁷. In its essence lies the reduction of carbon emissions and tackling the problem of environmental degradation and deterioration. The Agency supports the idea that the transition will be triggered by technological innovation and policy tools that will be dealing with excess use of fossil fuels and reducing CO² emissions.⁴⁸

According to this definition, Blazquez, Fuentes and Manzano base their analysis. In their work ‘On economic principles of the energy transition’, they begin by pointing out the importance of electrification of the energy sector. The reasoning behind this premise is that most renewable and sustainable forms of energy can generate electricity.⁴⁹ By implementing such a strategy society can reduce carbon emissions and the use of fossil fuels. Energy transition also has some grassroots on technology and innovation. This technological progression has allowed the emergence of a more decentralized system of production where more and more small producers enter the market because of the availability of such technology to the public.⁵⁰ Based on these elements stated above the

⁴⁷ Anon, Energy Transition. IRENA. Available at: <https://www.irena.org/energytransition> [Accessed April 7, 2022].

⁴⁸ Ibid

⁴⁹ Blazquez et al, 2020. On some economic principles of the Energy Transition. Energy Policy. Available at: <https://www.sciencedirect.com/science/article/pii/S0301421520305267> [Accessed April 7, 2022].

⁵⁰ Blazquez, Jorge, et al. “On Some Economic Principles of the Energy Transition.” Energy Policy, Elsevier, 16 Sept. 2020, <https://www.sciencedirect.com/science/article/pii/S0301421520305267>.

authors attempt to map out a theoretical framework of how this transition would unfold.⁵¹ The first stage would be “*low renewable penetration*”, the second stage would be “*high penetration of renewables*” and the third stage would be “*full integration of renewables*”.⁵²

Blazquez et al, additionally, suggest that a transition, based on the current facts and figures, would be caused by the policy makers and their decisions. Thus, energy transitions can vary from country to country. In addition, it may be technologically feasible to transition to a renewable energy-based future, with a favorable political environment, as a prerequisite. Restructuring the existing political sphere and shaking up the existing power relations, from benefiting the few to many, does not appear to be a simple task.⁵³ This is why the authors stress the importance of the politicization of the energy transition and that the policies are realized as the starting point of this transition.

Stephens, in her writing piece, acknowledges that in order to redistribute the existing political power from the few to many, society must transition from the infrastructure of fossil fuels.⁵⁴ This will lead to the disruption of the status quo and enable the prioritization of energy distribution among the people, allowing for a more fair and equitable ownership of the means of production and distribution.⁵⁵

Further adding to the literature of energy transition, Ciplet, argues that this energy transition represents a “paradigm shift”.⁵⁶ Ciplet uses Polanyi’s idea of “embeddedness” to describe the current paradigm of the economy.⁵⁷ The author is arguing that “*society disembedded the economy, including morality, ethics and politics from society and nature, and created ‘fictitious commodities’ in the form of land, labor, and money markets*”.⁵⁸ Fictitious in the sense of merely serving economic means of capital accumulation and not because of physical human needs. This disembedded approach has been integrated in the energy market as well. The commodification of energy, to serve capital accumulation, undermines the social and environmental importance that needs to be given and creates a sector governed by a non-sustainable or self-preserving system.⁵⁹ It is a system of “material well-being”

⁵¹ Ibid

⁵² Ibid

⁵³ Ibid

⁵⁴ Stephens, J.C., Energy democracy: Redistributing power to the people through renewable transformation. Taylor & Francis. Available at: <https://www.tandfonline.com/doi/full/10.1080/00139157.2019.1564212> [Accessed April 7, 2022].

⁵⁵ Ibid

⁵⁶ Ciplet, D., 2021. From Energy Privilege to Energy Justice: A framework for embedded sustainable development. Energy Research & Social Science. Available at: <https://www.sciencedirect.com/science/article/pii/S221462962100089X> [Accessed April 7, 2022].

⁵⁷ Ibid

⁵⁸ Ibid

⁵⁹ Ibid

characterized by market deregulation which creates induced demand and favors capital accumulation for the benefit of the already privileged.⁶⁰ Because being in control of the market translates to controlling societies' functions and shaping its identity as a whole.

As mentioned above, Ciplet argues that this energy transition represents a paradigm shift on the structuring of society, moving away from this "disembedded" mode of structure. Moreover, the author argues for the need of a paradigm shift on resources, rights and representation".⁶¹ In concern with resources, we need to transition from the existing form of organization, which promotes the access to a small and privileged group of people, to an inclusive and equitable structure, where the benefits generated are enjoyed by the majority.⁶² Resources that are now responsive to elites, capital and investors should shift into considering the social norms, values and systems.⁶³ This way, resources will serve the energy demand posed by societies. In terms of 'rights', Ciplet presents us with the argument that energy is understood through the lens of access to benefits.⁶⁴ A perspective aligned with the 'disembedded' structure previously mentioned. The author, in contrast, stresses the need to shift this perspective to one which perceives energy as 'right' and not 'benefit'.⁶⁵ "As 'rights' are necessary to protect basic entitlements for individuals and communities".⁶⁶ Because factual data have pointed out that communities of minorities have experienced a faulted proportion of the pollution of the planet.⁶⁷

The last element, according to Ciplet, that requires change is the paradigm of representation. The existing disembedded practices of representation refer to privileged access of the few to the means of societal governance. Ownership of natural resources and energy generated is also exclusive among the few. That is why, according to Marion Young, there is a need for creating political bodies which promote the rights of communities like the one mentioned in the above examples.⁶⁸ So the

⁶⁰ Ibid

⁶¹ Ibid

⁶² Ibid

⁶³ Ibid

⁶⁴ Stephens, J.C., *Energy democracy: Redistributing power to the people through renewable transformation*. Taylor & Francis. Available at: <https://www.tandfonline.com/doi/full/10.1080/00139157.2019.1564212> [Accessed April 7, 2022].

⁶⁵ Ciplet, D., 2021. *From Energy Privilege to Energy Justice: A framework for embedded sustainable development*. Energy Research & Social Science. Available at: <https://www.sciencedirect.com/science/article/pii/S221462962100089X> [Accessed April 7, 2022].

⁶⁶ Ibid

⁶⁷ Ibid

⁶⁸ Young, I.M., 2021. *Gender, Justice, and the Politics of Difference*. Routledge & CRC Press. Available at: <https://www.routledge.com/Iris-Marion-Young-Gender-Justice-and-the-Politics-of-Difference/Ferguson-Valls/p/book/9780367085643> [Accessed April 7, 2022].

representation of the people and their needs are formed based on all the communities that create the society as a whole.

Mohai et al, provided a qualitative analysis that suggested that there were discriminatory practices on waste management, with certain communities experiencing a disproportionate amount of environmental degradation in relation to others.⁶⁹ In his writing piece, he gives multiple examples of Latino and African-American communities which faced significantly larger amounts of toxins exposure and worse quality of air compared to the Anglo communities.⁷⁰ Protecting those communities and their environment should be considered a right and not a privilege.

The idea of energy transition being understood as a paradigm shift is also recreated by Byrne et al. They characterize the status of today's world as "energy obese".⁷¹ Meaning that society has become accustomed to expanding and developing without any regard for the quality of life or the environment. The modern state, which has commodified nature and life, is the result of its energy.⁷² Additionally, Mumford argued that the modern state values quantity over quality and so does with energy. The idea is also endorsed because of the wealth-power-energy relations. The examples of big oil titans and national champion companies indicate the dependency of these modern regimes on energy and how social and political power is accumulated through the use of energy as a commodity.⁷³ The modern state strives for more and more energy, capital and power. The social norm of living well in a modern state, having been influenced by this status, means existing with an infinite supply of goods and services, being almost completely alienated from the "outside".⁷⁴ This is why the author is arguing that there needs to be a paradigm shift and move away from the existing institution of the modern state. There is a need for less energy consumption and when required the energy used ought to be renewable.⁷⁵ J. Byrne also stands for the creation of an institutional body that is solely concerned with those matters, of reducing the excess energy consumption and reducing the reliance of communities on "energy giants".⁷⁶

⁶⁹ Mohai, P., 2009. Environmental justice. Annual Reviews. Available at: https://www.annualreviews.org/doi/10.1146/annurev-environ-082508-094348#_i9. [Accessed April 7, 2022].

⁷⁰ Ibid

⁷¹ Byrne, J., Martinez, C. & Ruggero, C., 2009. Relocating energy in the Social Commons: Ideas for a Sustainable Energy Utility. Sagepub. Available at: <https://journals.sagepub.com/doi/full/10.1177/0270467609332315> [Accessed April 7, 2022].

⁷² Ibid

⁷³ Ibid

⁷⁴ Ibid

⁷⁵ Ibid

⁷⁶ Ibid

In her work, Palle makes the effort to explore the concept of energy transition through the lens of geopolitics. This is because the dominant literature on energy transition has mainly been explored through the approach of sociotechnical governance that is concerned with creating a cohesive unit of actors within the energy sector.⁷⁷ For example, creating new infrastructure and new energy networks. But, by adopting the geopolitical lens, the author argues, that we can further explore the politics of transition but also the shift in power relations between these actors and resources management.⁷⁸ The concept of power and territory are also key within this framework as they link spatial, social and political structures which can be heavily impacted by the transition. As through the geopolitical lens, territorialization and the set of spatial boundaries are understood as the practice, the exercise of power by the actors within a given territory⁷⁹.

Acquiring ownership through territorialization also falls under the scope of power practices and could be used to explore power relations. France, before the emergence of renewable energy transition and sustainability had undergone another energy transition, but on a different level. France had undergone a transition from coal-based energy to nuclear energy. From 1950 to 1990 France had achieved 80% of its produced electricity derived from nuclear energy. This has arguably been understood as a successful energy transition.⁸⁰ The nuclear transition was facilitated mostly by governmental and centralized entities such as 'Electricity of France' (EDF), which was a state-owned entity that created a monopoly on the supply of electricity.⁸¹ Only in recent years have state entities like this, lost their omnipotent agency due to the integration of the European energy markets and the tendency for an energy transition based on renewable sources of energy.

The already completed transition to nuclear that took place in France years ago and has shaped and structured the French energy market is now being "shaken" because of the trend in renewables. The current dynamics of the market are in question as the powerful and established nuclear actors are threatened to lose their power due to the urgency of systemic change and decentralization.⁸² In the case of the island of Sein, prior to the emergence of the need for renewables, electricity was funneled by oil-fired plants as the island was not connected to the national electricity grid. This had a huge but inevitable cost but was necessary for the island habitants as there was not an alternative. The huge operational costs of those oil-fired plants were mostly covered through

⁷⁷ Palle, A., 2021. Bringing geopolitics to energy transition research. *Energy Research & Social Science*. Available at: <https://www.sciencedirect.com/science/article/pii/S2214629621003261> [Accessed April 7, 2022].

⁷⁸ Ibid

⁷⁹ Ibid

⁸⁰ Ibid

⁸¹ Ibid

⁸² Ibid

taxation. The capital accumulated from this tax was managed by EDF, which was the sole electricity supplier of the island. In 2011 the inhabitants of the island decided to march on a project that would transition the island's energy mix from oil-based electricity to renewable-based electricity.⁸³ The people of the island requested that the taxation money that were funneling the oil-based plants would be relocated in investing in renewable energy sources to support the island's autonomy on energy. Needless to say, they were met with opposition by EDF and the council of the island.

Regardless of the reasons presented, this was ultimately because EDF's dominant market position was challenged by the possibility of losing the privilege of being the sole electricity provider of the island.⁸⁴ After all, as it was proven there, EDF had no actual problem in relocating the taxation money towards renewables, as they presented a plan deploying renewable instead of oil-based energy. It was the notion of decentralization that threatened EDF's position as being a centralized state-owned entity. This example can provide some emphasis on the dynamic power relations that exist on the energy market and the importance of control and ownership of not only the energy sources but distribution grids too.

Palle, as I mentioned already, presents us with a case study regarding the French energy governance in the island of Sein.⁸⁵ Under the geopolitical lens, the author attempts to deconstruct the conflict that arose between the island's inhabitants and the French government. More specifically we are present with a conflict of power dynamics between the ongoing sustainable transition and the existing system of nuclear electricity that was funneling the island.

Adding to the existing literature of energy transition, Sovacool attempts to examine the term, mainly focusing on "*the timing and its temporal dynamics*".⁸⁶ But to begin with he touches on some "mainstream definitions of the term" as presented by other scholars. Between all these definitions, there are relative notions to the term that are commonly identified such as a change in energy sources or a technological advancement that presents new ways of energy practices.⁸⁷ Another common element that is used to define this transition is the "revolutionary" essence that it carries as pointed out by many activists. Challenging the existing market and power structure that is established.

⁸³ Ibid

⁸⁴ Ibid

⁸⁵ Ibid

⁸⁶ Sovacool, B.K., 2016. How long will it take? conceptualizing the temporal dynamics of Energy Transitions. Energy Research & Social Science. Available at: <https://www.sciencedirect.com/science/article/pii/S2214629615300827> [Accessed April 7, 2022].

⁸⁷ Ibid

What Sovacool is concerned about, though, is the *“transition timeline and pathway”*.⁸⁸ Drawing from Grubler’s and Wilson’s work, Sovacool conceptualized this pathway as having four distinct phases. First phase of the transition would be, *“an extended period of experimentation and learning with small unit-scale technologies and diversity designs, with industry scale being generally small and diverse”*.⁸⁹ The second phase commences with the *“scaling up of the unit level as designs are improved and economies of scale begin to emerge”*.⁹⁰ Phase three is where *“scaling-up happens at the industry level and large units are being sold in core markets”*.⁹¹ The last phase of a transition would mark the standardization of the newly formed market structure with core markets becoming saturated, further industry growth by globalization”.⁹² Sovacool realizes that, within the transition timeline, each phase of the transition requires substantial time to be completed, thus making the whole process time-consuming as it can span for years, even decades.

Regarding the pathway of the transition, Sovacool draws on the work of Geels and Schot. What they did was, they identified four potential pathways while taking into consideration *“the timing required and the multi-level interactions that occur and enable the transition”*.⁹³ The first pathway provided is that of technological substitution based on niche innovations which are produced because of the landscape pressure.⁹⁴ Important to note here is that the term ‘landscape’ *“refers to exogenous factors and developments such as economic crises, wars, environmental disruptions”* and events of such that apply pressure on the existing regime.⁹⁵ Second pathway is that of transformation because of landscape pressures that forces actors to adjust the existing regime when innovations prove insufficient.⁹⁶ The third pathway describes the *“reconfiguration of the regime based on niche innovations that are incorporated and that trigger further adjustments”*.⁹⁷ Last pathway identified is that of *“dealignment and realignment, in which major landscape pressures destabilize the regime when niche-innovations are insufficiently developed and co-exist”*.⁹⁸ As this is followed by the restructuring of the regime around those niche innovations. Nevertheless, moving away from existing market structures and systems required a substantial amount of time and proposed *“long-term*

⁸⁸ Ibid

⁸⁹ Ibid

⁹⁰ Ibid

⁹¹ Ibid

⁹² Ibid

⁹³ Ibid

⁹⁴ Ibid

⁹⁵ Ibid

⁹⁶ Ibid

⁹⁷ Ibid

⁹⁸ Ibid

transformation that is messy, conflictual and a highly disjointed process".⁹⁹ Smil writes the common element of the energy transition is the time period required to be accomplished.¹⁰⁰ *"The greater the scale of prevailing uses and conversions, the longer the substitutions will take"*.¹⁰¹

An important contribution to the literature of energy transition has also been made by Thombs. In his work, Thombs tries to outline the potential energy futures that might arise from the transition to renewable energy sources that has begun to take place in recent years all across the globe. More specifically, as shown in Figure 1, he offers four potential energy futures, those being libertarian energy decentralism, technocratic energy centralism, democratic energy centralism and democratic energy decentralism.¹⁰² He produces those potential futures based on a system he created that comprises a 2x2 matrix. Within this matrix there are two axis X and Y. According to Thombs, "These futures are imagined as lying along a two-dimensional spectrum where the structural organization of the society lies along the x-axis, and the scale of the energy system on the y-axis".¹⁰³ About the X axis, its left side is labeled as 'democratic' and its right side is labeled as 'monopolistic'.¹⁰⁴ Similarly, the top end of the Y axis is labeled as 'centralized' and the bottom side is labeled as 'decentralized'.¹⁰⁵ Table 2 displays the four potential outcomes of an energy transition, according to Thombs as listed below.

⁹⁹ Ibid

¹⁰⁰ Smil, V., Energy myth and realities: Bringing science to the energy policy debate. Vaclav Smil. Available at: <https://vaclavsmil.com/2010/06/01/energy-myth-and-realities-bringing-science-to-the-energy-policy-debate/> [Accessed April 7, 2022].

¹⁰¹ Ibid

¹⁰² Thombs, R.P., 2019. When democracy meets energy transitions: A typology of social power and Energy System scale. Energy Research & Social Science. Available at: <https://www.sciencedirect.com/science/article/pii/S2214629618307692> [Accessed April 7, 2022].

¹⁰³ Ibid

¹⁰⁴ Ibid

¹⁰⁵ Ibid

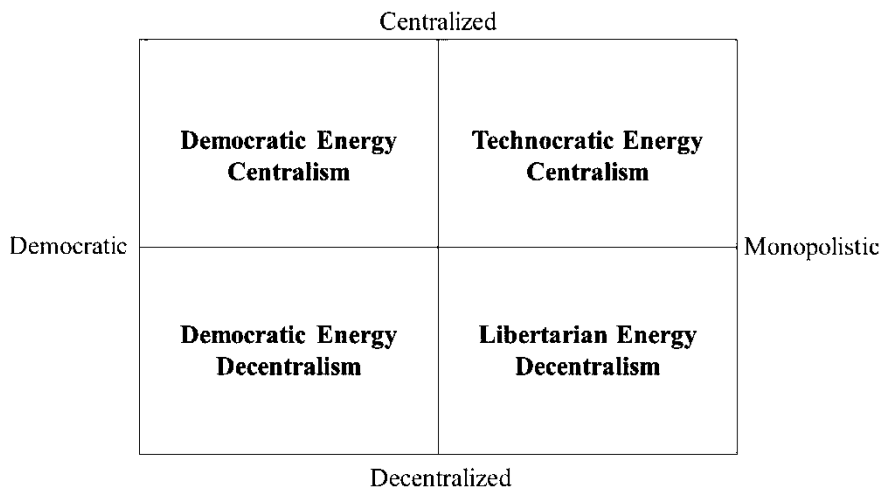


Figure 1. Four potential energy futures

Source: (Thombs, Ryan P. "When Democracy Meets Energy Transitions: A Typology of Social Power and Energy System Scale.")

Within this system, Thombs demonstrates a two-dimensional character that is produced by the four potential energy futures. The X axis represents the first dimension which is the *"organization of the social and the Y axis represents the scale of energy systems"*.¹⁰⁶ He believes that those two dimensions interact with each other to reproduce those potential futures and break them down into four quadrants as shown in Figure 1 above.

Focusing on the first potential energy future, named 'libertarian energy decentralism', we can observe its definitions being drawn by a monopolistic and decentralized character. It is regarded as monopolistic because of a *"small number of wealthy elites that exert social and economic control"*.¹⁰⁷ But there is also a distribution of technologies among market actors thus creating a decentralized structure. The market mostly consists of privately owned enterprises driven by profits and with little oversight from the government. *"Energy is regarded as a private good, and people do not have access to it unless they are able to purchase it as end-users"*.¹⁰⁸ Second potential energy future is that of 'technocratic energy centralism'. This type of structuring is *"characterized by monopolistic control over political, economic, and civil institutions that are reliant on centralized energy"*.¹⁰⁹ This potential scenario is described by either state or private ownership, but both provide little to no accountability

¹⁰⁶ Ibid

¹⁰⁷ Ibid

¹⁰⁸ Ibid

¹⁰⁹ Ibid

to the public thus operating as a monopoly, with power being concentrated by those few market actors.¹¹⁰ Thus national and centralized grids are also an important component of this structure. The third potential outcome of the renewables transition is the 'democratic energy centralism'. This structural model *"is defined as a society composed of democratically controlled political, economic, and civil institutions with a centralized energy system"*.¹¹¹ Deliberation and participation is key within this structure but the technologies of energy are centralized.¹¹² Institutions with such technologies would be held accountable by the general public, in this case. Those in possession of such technologies ought to not make decisions autonomously but to take into consideration the opinion of the masses. Thus, promoting fundamental pillars of democracy. The last potential future discussed is 'democratic energy decentralism'. Here, we can observe the same line of thinking with the previously mentioned 'democratic energy centralism' but with a key distinction being the decentralized operation of energy systems.¹¹³ This future is also the democratization of government and energy institutions and systems and promotes *"localized control rather than bureaucratic governance of the energy system"*.¹¹⁴

While energy transition has been evaluated through different lenses, there seems to be a consistent pattern of emphasizing the restructuring of society as a whole and as to extent the energy sector. As it is understood, the practices of the energy sector and energy decisions have been in favor of a few privileged entities within society. Furthermore, renewable forms of energy are at the core of this transition as it will enable more reliable and clean energy flows with big environmental benefits. Below I have included a figure which summarizes the literature I touched upon, regarding energy transition.

Table 2. A synopsis of the literature and definitions of Energy Transition

IRENA (International Renewable Energy Agency)	<ul style="list-style-type: none"> - Energy transition can be characterized as a pathway toward transforming the global energy sector from fossil fuel-based to zero-carbon by the second half of the century.
Blazquez et al	<ul style="list-style-type: none"> - In regards to how a transition will unfold: the first stage is low renewable penetration", the second stage is high penetration and the third stage is full integration of renewables.

¹¹⁰ Ibid

¹¹¹ Ibid

¹¹² Ibid

¹¹³ Ibid

¹¹⁴ Ibid

Stephens	- A transition from the infrastructure of fossil fuels which leads to the disruption of the status quo and enables the prioritization of energy distribution among the people
Ciplet	- Transition from the existing economic paradigm which disembedded ethics and morality to commodify and capitalize.
Mohai et al	- Change in the paradigm of representation as the existing disembedded practices of representation refer to privileged access of the few.
Byrne et al	- Shift away from the existing institution of the modern state and consume less energy and include more renewables in the energy mix.
Palle	- Using the geopolitical lens, we can understand a shift into the world's power relations regarding territorial control and ownership.
Sovacool	- Understands the potential pathway of the transition. The first phase is an extended period of experimentation, second is scaling up of the unit level, the third is where scaling-up happens at the industry and last marks the standardization of the newly formed market structure.
Thombs	- Understands four potential energy futures: Democratic Energy Centralism, Democratic Energy Decentralism, Technocratic Energy Centralism, Libertarian Energy Decentralism.

2.3 Relations between democracy and energy

On the link between energy and the contemporary democratic states, D. Sweidan has identified the contradictory nature between the capitalist structure and the idea of energy democracy.¹¹⁵ More specifically, the author argues that it is impossible for state capitalism and energy democracy to coexist because of the contradictory conditions required by them. State capitalism is mostly centered around the concepts of political power and economic power, wealth and

¹¹⁵ Sweidan, O.D., 2021. State Capitalism and Energy Democracy. Geoforum. Available at: <https://www.sciencedirect.com/science/article/pii/S001671852100107X#b0035>. [Accessed April 7, 2022].

governance.¹¹⁶ This policy mix, aimed towards accumulating such powers, have indeed contributed to the creation of a powerful authoritarian regime. With this already existing structural formation, the newly emerged idea of energy democracy, which focused on tackling the environmental deterioration and climate change, has occurred through the unconscious use of fossil fuels.

Energy democracy supports the deployment of renewable sources of energy as a means to combat these environmental problems, whereas state capitalism, as of now, can be understood as dependent on fossil fuels, not only for producing but also for creating the power relations of society. This is, according to the author, the contradictory nature of these modes of structure.¹¹⁷ In state capitalism, the state is what controls the free market.¹¹⁸ The state also is in control of the resource and their allocation which in itself creates wealth and power. To be more precise, according to data presented by British Petroleum, for the year of 2020, big national oil companies are owners of a tremendous percentage of the world's gas and oil reserves.¹¹⁹ Such state-owned institutions, generating competition among the world, are mixing power and wealth to create the state's authority. Those elements have led to the alienation of the democratic principles of fair representation, inclusion and participation of the majority in the important decision-making activities. It centralizes power to the specific state institutions of governance and thus promotes inequality and privileges to the small elite. As mentioned, supported also by the author, these values of state capitalism contradict democratic values and as a consequence contradict the concept of energy democracy. Energy democracy advocates for fair and equitable treatment of the natural resources. On the other hand, state capitalism is keen in controlling the natural resources in the sake of the existing dominant power relations the state has.

Stephens, in her work, also provides elements of the contradictory nature of the contemporary capitalist structure and energy democracy. It is evident that renewable sources of energy are a core element of energy democracy and a starting point of the energy transition.¹²⁰ Adopting renewables results in a redistribution of power, because of the decentralization of resources and more equitable distribution among the people, including the energy-poor communities. Through

¹¹⁶ Ibid

¹¹⁷ Ibid

¹¹⁸ Ibid

¹¹⁹ Ibid

¹²⁰ Stephens, J.C., *Energy democracy: Redistributing power to the people through renewable transformation*. Taylor & Francis. Available at: <https://www.tandfonline.com/doi/full/10.1080/00139157.2019.1564212> [Accessed April 7, 2022].

public ownership and energy cooperatives, can society be restructured. *“By shaking the existing privately investor-owned utilities”*.¹²¹

The author identifies three main components of energy democracy that contradict in nature the fossil-based capitalist structure of today. The first would be the inclusion of the majority in the processes of energy generation and distribution. Renewables can be major in this instance, as their deployment can be done by individual households or small communities, which could potentially deem them as self-sufficient energy-wise.¹²² Moving away from the centralized state institution of energy that accumulates wealth and power at the expense of those communities. Secondly, society’s development shall not be done at the expense of nature and the environment as they become an important element in advancing and developing. Society’s development shall not be governed solely by power and wealth accumulation. Lastly, as renewable sources of energy can be found all around the world, they promote a system not of the few but for the many. Harnessing such resources will promote competition among communities for the common good.¹²³ Contradicting the existing notions of individual success and wealth. The elements above construct state capitalism which contradicts energy democracy.

An important concept, core to both energy democracy and politics are the definition of the “public”.¹²⁴ The discourse of setting boundaries and distinguishing people as a means to form communities is deeply political and is of paramount importance in the energy sector. This is increasingly evident when considering large-scale energy projects. Within the context of an energy project such as the creation of wind parks or the installation of solar panel cells, different communities are affected and “feel” the impact of such projects.¹²⁵ This is why the assessment of the affected communities is of value to the decision-making regarding the energy project. These communities, directly affected by the impacts of these projects, could be understood as the “local” public. Pesch in his work, outlines certain steps to which we can establish a separation between communities and thus create the “local” public.¹²⁶ The first reason given, is the set of clear boundaries to distinguish the different publics.¹²⁷ The second reason is the public's need to be transformed into a singular expression, forming and acting a single entity and lastly, the public ought to have the ability to share

¹²¹ Ibid

¹²² Ibid

¹²³ Ibid

¹²⁴ Pesch, U., 2019. Elusive publics in energy projects: The politics of localness and energy democracy. Energy Research & Social Science. Available at: <https://www.sciencedirect.com/science/article/pii/S2214629618311149> [Accessed April 7, 2022].

¹²⁵ Ibid

¹²⁶ Ibid

¹²⁷ Ibid

their thoughts and assessment with the decision-makers of the energy project.¹²⁸ The above reason allows for the different publics to reach a certain level of homogeneity within and create a singular essence. A sense of collectivity that allows the individual to perceive themselves as belonging in a bigger community in which he has a role in the process of decision-making. In many cases, these energy projects are what create the public as a response by those who are affected.¹²⁹ Nevertheless, the political discourse of identifying communities or the public has a huge influence on the works of the decision-makers.

The above-mentioned concept of ‘localness’ and local public allows me to further proceed with my analysis by including the term ‘energy community’. Drawing from the previously mentioned point that ‘publics’ ought to be perceived as one singular expression, we can understand the necessity of creating communities as such, that will act as a singular unit composed of individuals with similar interests, goals and ambitions.¹³⁰ From the primitive communities formed to harvest, farm, and build shelters we are now faced with a new kind of community formed with the interest of providing secure supplies of energy and helping the renewable energy transition by moving away from centralized and fossil fuel-based energy to renewable and localized energy sources.¹³¹ The EU under the Clean Energy Packet (CEP) legislation has defined energy communities as *“legal entities which are based on open and voluntary participation, are autonomous, are controlled by the shareholders that are located in proximity of the potential energy project and develop such projects from within”*.¹³² The purpose of those projects is to provide environmental, social and economic benefits to the shareholders and the community.

So, energy communities are an initiative, providing a different form of collective organization of individuals. We can understand that governance, ownership and control and generating the different types of benefits for the community are the core pillars of conceptualizing energy communities. Important to note that communities, despite having the same fundamental pillars, might differentiate from one another. Geographical position and “localness” might differ in each community. As the proximity of each project differs thus those who are directly affected also change.

¹²⁸ Ibid

¹²⁹ Ibid

¹³⁰ Anon, 2020. Energy communities under the Clean Energy Package. REScoop. Available at: <https://www.rescoop.eu/news-and-events/events/energy-communities-under-the-clean-energy-package> [Accessed April 7, 2022].

¹³¹ Bauwens, T. et al., 2021. Conceptualizing community in Energy Systems: A systematic review of 183 definitions. Renewable and Sustainable Energy Reviews. Available at: <https://www.sciencedirect.com/science/article/pii/S1364032121012624> [Accessed April 7, 2022].

¹³² Anon, 2020. Energy communities under the Clean Energy Package. REScoop. Available at: <https://www.rescoop.eu/news-and-events/events/energy-communities-under-the-clean-energy-package> [Accessed April 7, 2022].

Citizens' activities might also differ within each community. Because there might be communities operating within the electricity sector but might be using different types of energy sources to potentially generate electric power. One community might be focusing on solar power generation to serve their electricity needs and another one might be generating electricity through wind parks and turbines. Focusing on the definition given above and considering the notion of ownership and control over resources and energy projects, we can understand that energy communities present a way towards decentralizing the energy sector and helping with the deployment of renewable energy sources.

Bauwens et al. also indicate the attempt of such communities to “*shake the existing power relations and inequalities within energy systems*”.¹³³ Communities of such, also enforce the idea of independence of national grids and centralized forms of distribution and generation. These communities promote sustainable energy development and climate protection, arguments that directly contradict the dominant existing structure of the energy sector, that of the national centralized “champions” that operate largely based on fossil fuels.¹³⁴ It is thus, fair to say that energy communities attempt to democratize energy and its market. They support the transformation of consumers to prosumers.¹³⁵ Meaning, individuals moving away from the passive characteristics of just consuming to become able to also produce, distribute and consume energy in an autonomous and efficient manner.¹³⁶

Ultimately the creation of energy communities that empower prosumers and oppose the centralized energy systems attempt to promote “*energy justice*” among the people and communities.¹³⁷ This term has increasingly become popularized in the field of studies of energy democracy and energy transition. The newly appointed Biden administration, recognizing the importance of energy justice, has assigned professor Shalanda H. Baker to “*serve as the Secretarial Advisor on Equity and as ‘Deputy Director for Energy Justice’ in the Office of Economic Impact and*

¹³³ Bauwens, T. et al., 2021. Conceptualizing community in Energy Systems: A systematic review of 183 definitions. *Renewable and Sustainable Energy Reviews*. Available at: <https://www.sciencedirect.com/science/article/pii/S1364032121012624> [Accessed April 7, 2022].

¹³⁴ Ibid

¹³⁵ Gjorgievski, V.Z., Cundeva, S. & Georghiou, G.E., 2021. Social Arrangements, technical designs and impacts of Energy Communities: A Review. *Renewable Energy*. Available at: <https://www.sciencedirect.com/science/article/pii/S0960148121000859> [Accessed April 7, 2022].

¹³⁶ José, D.de S., Faria, P. & Vale, Z., 2021. Smart Energy Community: A systematic review with metanalysis. *Energy Strategy Reviews*. Available at: <https://www.sciencedirect.com/science/article/pii/S2211467X2100064X> [Accessed April 7, 2022].

¹³⁷ Heffron, R.J., 2021. Applying energy justice into the energy transition. *Renewable and Sustainable Energy Reviews*. Available at: <https://www.sciencedirect.com/science/article/pii/S1364032121012016> [Accessed April 7, 2022].

*Diversity at the U.S. Department of Energy*¹³⁸. Thus, it is evident that ‘energy justice’ is at the forefront of contemporary political agendas.

Ciplet understands ‘energy justice’ as a response, firstly adopted by activists, to battle “*inequitable outcomes and decision-making processes related to fossil fuel energy projects*”.¹³⁹ This concept was built upon the concept of environmental justice along with notions of political theory.¹⁴⁰ Energy justice principles are concerned with equity on the procedures, distribution of energy but also in recognition of unfair treatment of certain communities that experience inequitable treatment regarding the volumes of energy and its security. Sovacool attempted to engage with certain philosophical concepts that are of major importance regarding the notion of ‘energy justice’. Availability, affordability, sustainability, good governance and equity among the communities are some fundamental pillars of energy justice¹⁴¹.

Sovacool, in his writings, defines ‘energy justice’ as “*a framework, which is able to engage with and reform the dominant paradigms of energy-based thinking in society*”.¹⁴² Along this line of thinking, Sovacool also introduced the concept of energy injustice to clarify even further the notions in question. According to him, energy injustice can be identified as a system of exclusion, a system of unfair distribution of costs but also the benefits of the energy decisions and projects in practice. Sovacool even went as far to create a “*tangible Energy Justice Metric*”. What this metric does is it “*captures the dynamics of energy justice*”.¹⁴³ It tries to also advance the concept by implementing economic thinking and provides an energy decision-making tool for more fair and equitable practices”.¹⁴⁴ Because within this field of studies, it has been identified that there exist some forms of racism within our energy systems. Activists and scholars have argued against this form of racial injustice within the energy sector.

¹³⁸ “Anon, Shalanda H. Baker. Energy.gov. Available at: <https://www.energy.gov/diversity/person/shalanda-h-baker> [Accessed April 7, 2022].

¹³⁹ www.sciencedirect.com/science/article/pii/S221462962100089XCiplet, D., 2021. From Energy Privilege to Energy Justice: A framework for embedded sustainable development. Energy Research & Social Science. Available at: <https://www.sciencedirect.com/science/article/pii/S221462962100089X> [Accessed April 7, 2022].

¹⁴⁰ Ibid

¹⁴¹ Sovacool, B.K., McCauley, D. & Heffron, R.J., 2015. Resolving society's energy trilemma through the Energy Justice Metric. Energy Policy. Available at:

<https://www.sciencedirect.com/science/article/pii/S030142151530077X#s0010>. [Accessed April 7, 2022].

¹⁴² Ibid

¹⁴³ Ibid

¹⁴⁴ London, J.K., 2008. Environmental justice at the crossroads. ResearchGate. Available at: https://www.researchgate.net/profile/Jonathan-London-2/publication/227689033_Environmental_Justice_at_the_Crossroads/links/5ceeb41b299bf1fb18493a11/Environmental-Justice-at-the-Crossroads.pdf [Accessed April 7, 2022].

Many indigenous African-American communities have been facing environmental disadvantages. “Environmental racism” is a term used by K. London and does describe the “disproportionate pollution on racial minorities”¹⁴⁵. Nevertheless, recognizing the importance of the concept, governments and political theorists have indeed adopted ‘energy justice’ as a fundamental point and practice.¹⁴⁶ London, in another work of his, outlines his provisions of a plan moving towards a more just energy structure in the state of California. He states that “all Californians regardless of age, race, culture, income, or geographical locations should be protected by any adverse environmental and health effects of pollution”.¹⁴⁷ This example shows the extent to which the political sphere is trying to implement ‘energy justice’ and institutionalize fair and equitable treatment among the different communities. Taylor also understands the differences in experiences by people with different demographic and cultural characteristics.¹⁴⁸ Racist practices of such could be the increased likelihood of being exposed to environmental hazards or the unjust appropriation of land, based on social and cultural characteristics.

Jenkins et al. also provided some contribution in the literature of ‘energy justice’. They provide a conceptual framework of the term by focusing on three aspects of justice. Those being distributional, recognition and procedural justice. This is based on the premise that if injustice is to be tackled, we need to understand how “benefits are being ill distributed, remediated and victims are recognized”.¹⁴⁹ “Distributional justice recognizes both the physically unequal allocation of environmental benefits and ills and the uneven distribution of their associated responsibilities”.¹⁵⁰

The German energy strategy, named ‘Energiewende’, could serve as an example as it calls for the reconceptualization of the distribution process of energy. It supports the decarbonization and the closing of nuclear energy plants as a means to decentralize the energy sector and move away from fossil fuel-based energy.¹⁵¹ The second notion of justice examined is recognition of justice.

¹⁴⁵ Ibid

¹⁴⁶ Ibid

¹⁴⁷ London, J.K. & Liévanos, R.S., 2008. Problems, Promise, Progress, and Perils: Critical Reflections on Environmental Justice Policy Implementation in California. ResearchGate. Available at: https://www.researchgate.net/publication/238739863_Problems_Promise_Progress_and_Perils_Critical_Reflections_on_Environmental_Justice_Policy_Implementation_in_California [Accessed April 7, 2022].

¹⁴⁸ Taylor, D.E., 2000. The Rise of the Environmental Justice Paradigm: Injustice Framing and the Social Construction of Environmental Discourses. ResearchGate. Available at: https://www.researchgate.net/publication/237644402_The_Rise_of_the_Environmental_Justice_Paradigm_Injustice_Framing_and_the_Social_Construction_of_Environmental_Discourses [Accessed April 7, 2022].

¹⁴⁹ Jenkins, K. et al., 2015. Energy justice: A conceptual review. Energy Research & Social Science. Available at: <https://www.sciencedirect.com/science/article/pii/S2214629615300669> [Accessed April 7, 2022].

¹⁵⁰ Ibid

¹⁵¹ Sovacool, B.K., McCauley, D. & Heffron, R.J., 2015. Resolving society's energy trilemma through the Energy Justice Metric. Energy Policy. Available at: <https://www.sciencedirect.com/science/article/pii/S030142151530077X#s0010>. [Accessed April 7, 2022].

*“Recognition justice is more than mere tolerance and states that individuals must be fairly represented, that they must be free from physical threat and that they must be offered complete and equal political rights”*¹⁵². This allows people with different cultural and demographic characteristics to be acknowledged. Lack of recognition can also come in the form of misrepresentation, alienating demands and failing to meet the needs of communities.

Here Jenkins provides us with the example of the isle of Lewis and how the Scottish government failed to recognize the culture of the local community. The government, in 2008, made a proposal for a wind turbine project to take place, which would provide big economic benefits for the local community and for the country’s energy sector as a whole.¹⁵³ What happened was that this scheme was met by local opposition. The islanders presented numerous objections on an economic and political level. Instead, islanders took the matter into their own hands, acquiring large amounts of land that allowed them to build their ‘own’ wind park, using the already existing local infrastructure.

This goes to show how misrepresentation, the lack of cultural awareness and sensitivity can create a sense of injustice and legitimacy. But also, how *“the sense of community ownership can help in accepting such projects”*.¹⁵⁴ Lastly, *“procedural justice focuses on access to decision-making processes that govern the distributions outlined. It manifests as a call for equitable procedures that engage all stakeholders in a non-discriminatory way”*.¹⁵⁵ Jenkins supports that we can achieve procedural justice by mobilizing local knowledge, disclosing information to the public and the equal representation of the people in government institutions.¹⁵⁶ This way we can only achieve a fair and equitable energy sector, moving away from centralized forms of governance and empowering the people.

2.4 Discussion

The emerging issues regarding the deterioration of the environment, global warming and the excessive amount of CO² emission have led to the reconceptualization of energy practices and the sector as a whole. An emerging idea of this reconceptualization is energy democracy. An idea that supports a fundamental transition, a paradigm shift of the already existing structures of state and capitalism, which have led to an ‘energy obese’ world, with no other goal than power and wealth. From this, the alienation from the democratic principles is a product of the structure. State ownership

¹⁵² Ibid

¹⁵³ Jenkins, K. et al., 2015. Energy justice: A conceptual review. Energy Research & Social Science. Available at: <https://www.sciencedirect.com/science/article/pii/S2214629615300669> [Accessed April 7, 2022].

¹⁵⁴ Ibid

¹⁵⁵ Ibid

¹⁵⁶ Ibid

and authority are the means by which power is centralized on national champions that recreate this ongoing cycle between power and resource control. The small elite controls the resources because of their power and acquires more power because of their control over resources. The reasons above why more scholars, researchers and politicians are arguing for this transition into an energy democracy. It is to be noted, that one must identify the difficulties and limitations this transition possesses and that will require big political, social and financial efforts.

Regarding the aforementioned concept of “*energy communities*”, it may be said that the concept is a derivative of the early “*self-management*” political concept. An important political input would be to recognize this concept has not been just a variation of a centralized economy applied in Tito’s Yugoslavia. One can also refer to the experiment of the Scottish Daily, a left-of-center daily newspaper published in Glasgow between 5 May and 8 November 1975. It was hailed as Britain’s first worker-controlled, formed as a cooperative by 500 of the 1846 journalists, photographers, engineers and print workers who were made redundant in April 1974 by Beaverbrook Newspapers.

The pros and cons of self-management are well known by now. In the case of energy communities though, the energy production cost from renewable sources is competitive or lower compared to energy production from fossil fuels, plus the environmental benefit creates an incremental profit margin, large enough to cover the “costs of democracy” that accompanies those communities. By “cost of democracy” we refer primarily to delay in decision making and incapability and lack of experience of the managerial participants. This is another aspect of the relation between energy communities, energy democracy and finally, energy transition.

Chapter 3: Case studies

3.1 The paradox of the Chinese energy revolution.

As pointed out, the idea of energy democracy and renewables presents an alternative option to combat the contemporary climate and environmental problems. But then, why aren't countries 'simply' adopting such a political agenda? The reality is that there are multiple implications when engaging with this political approach. Implications that extend beyond the energy sector and ultimately affect the whole globe. At this point in my discussion, I would like to focus on the case of China and its renewable energy agenda or as they named it 'China's energy revolution' or the 'Green Dragon'. A plan was made by China, to attempt to combat its excessive carbon emissions and the environmental pollution caused by China's industry. This case presents an intriguing situation, where the country with the largest industry in the globe tries to adopt a more sustainable approach toward societal development. I will present some descriptive information regarding China's case and also try to understand the relations between economic growth and environmental pollution and their paradoxical nature.

It must be stated that China has heavily relied upon fossil fuels and mainly coal in the last few decades. In 2013 alone, China consumed 2943 Mtce of coal. That accounted for almost half of the global coal consumption of that year.¹⁵⁷ About half of the coal used by China was utilized in energy production.¹⁵⁸ In 2021, China's coal demand rose thus coal imports also rose, as compared to the previous year.¹⁵⁹ Additionally, there was an increase in the output of other fossil fuels too, such as oil and gas. Additionally, the Chinese fossil fuel emissions accounted for almost a third of the global emissions.¹⁶⁰ Logically, this excessive emission of greenhouse gasses has led to the deterioration of the environment and most notably the quality of air within Chinese cities.

The Chinese State Council issued a plan to battle pollution and improve the quality of air in the cities. This plan, named 'Blue Sky war', derives its name from the goal of 'cleaning the air' and 'making the sky blue again' as the pollutant clouds above the cities have 'turned the sky gray and

¹⁵⁷ Yuan, J., 2016. The future of coal in China. Resources, Conservation and Recycling. Available at: <https://www.sciencedirect.com/science/article/pii/S0921344916303731?via%3Dihub#sec0005>. [Accessed April 7, 2022].

¹⁵⁸ Ibid

¹⁵⁹ BP Statistical Review of World Energy 2020. Available at: <https://www.bp.com/content/dam/bp/business-sites/en/global/corporate/pdfs/energy-economics/statistical-review/bp-stats-review-2020-full-report.pdf>.

¹⁶⁰ Ibid

red'.¹⁶¹ Provisions of the plan included a 15% reduction on Sulfur dioxide and nitrogen oxide by 2020 in comparison to the 2015 level and an 18% reduction of PM2.5 density which represents the number of inhalable particles in the air.¹⁶² Nevertheless, China is still the biggest importer and exporter of coal and its energy mix is still dominated by fossil fuels and coal. This is becoming more problematic as the rest of the world is making efforts to move away from fossil fuels entirely. It is evident that China is pressured nationally and internationally to decrease its emissions and comply with the new greener politics against climate change.

In response to that and the increased attention China was receiving at this point of time because of the withdrawal of the US from the Paris agreement, President Xi Jinping “called for an ‘Energy Revolution’ plan.”¹⁶³ This plan, which was introduced in 2014, included provisions regarding the reduction of excess energy consumption and “capping energy growth from fossil fuels and particularly coal”.¹⁶⁴ Emphasis is also given in diversifying the supply of energy. To move to cleaner practices of coal usage and also increase the presence of renewables in China’s energy mix. Both consumption and production of energy are at the forefront of this energy plan.¹⁶⁵

A year after having introduced the ‘Energy Revolution’, the Chinese government also ‘committed to achieving the peak of greenhouse gas emissions by the year of 2030.’¹⁶⁶ China additionally pledged to cut the share of fossil fuel-based energy consumption by 20%.¹⁶⁷ Furthermore, China also included that by 2030 it will have cut down almost one-third of the GDP carbon intensity. Studies introduced by the IEA, argue that 2013 was the peak of coal usage in China. Technological research, development and innovation to increase energy efficiency in energy systems is also a key component of the Chinese energy strategy. The roadmap of this energy revolution includes provisions for the “overall arrangement for energy revolution systems, clean production of fossil energy and radical transformation of energy consumption pattern away from the current extensive growth pattern while attaching equal importance to policy orientation and constraints”.¹⁶⁸ As mentioned, it required coal usage to be capped to 5 billion tons, to be precise. Also, this amount of coal must not

¹⁶¹ IEA, Three-Year action plan for cleaner air (also called the Blue-Sky War). IEA. Available at: <https://www.iea.org/policies/8508-three-year-action-plan-for-cleaner-air-also-called-the-blue-sky-war> [Accessed April 7, 2022].

¹⁶² Ibid

¹⁶³ Liu, Q. et al., 2017. China's Energy Revolution strategy into 2030. Resources, Conservation and Recycling. Available at: <https://www.sciencedirect.com/science/article/pii/S0921344917303130> [Accessed April 7, 2022].

¹⁶⁴ Ibid

¹⁶⁵ Ibid

¹⁶⁶ Ibid

¹⁶⁷ Ibid

¹⁶⁸ Ibid

exceed 58% of the total energy mix of the country.¹⁶⁹ Renewables and other clean forms of energy should be increased within the energy mix and account for 15% of the energy supply.¹⁷⁰ This way, China will peak its coal usage before 2030. After that year, the energy market will have developed and matured in such way that it will have become self-sustainable¹⁷¹.

With this 'Energy Revolution Strategy', China seeks to establish a nation that generates more than half of its energy mix via clean and non-fossil fuel sources. Energy systems will have advanced in such a way that they would modernize Chinese societies and will provide secure flows of energy in an efficient manner. By 2050, China seeks to be at the forefront of clean and renewable energy. The market will have developed and is envisioned to be a global leader in technologies, efficient energy systems and be able to influence the world's energy governance.¹⁷²

Thus China, as the world's leading developing economy, has rapidly begun to invest in clean energy megaprojects. Indeed, we can identify that by the fact that China is the biggest wind and photovoltaic power generator in the world. The IEA predicts that 20% of China's electricity will be generated by solar energy. This also indicates the strengthening and "great potential of China's solar power market".¹⁷³ In 2020 alone, China installed new photovoltaic parks with a total capacity of 253GW. This accounted for almost a third of the total global photovoltaic capacity.¹⁷⁴ China is also leading in the global generation of wind power. China has the largest wind power generating facilities in the world. More specifically, estimations show around a capacity of 2,400 GW on the mainland and 200GW on the coastal areas.¹⁷⁵ This massive and rapid growth of clean energy generation has characterized China as a country with mega projects with enormous generative capacity.¹⁷⁶

Along with its rapid economic growth, China requires substantial amounts of energy to keep up with industrial and societal development. The energy demand is being met more and more via renewable sources, but in no way can it be fully fulfilled by renewables.¹⁷⁷ Fossil fuels remain the

¹⁶⁹ Ibid

¹⁷⁰ Ibid

¹⁷¹ Ibid

¹⁷² Ibid

¹⁷³ Li, J. & Huang, J., 2020. The expansion of China's Solar Energy: Challenges and policy options. *Renewable and Sustainable Energy Reviews*. Available at: <https://www.sciencedirect.com/science/article/pii/S1364032120302938#sec2>. [Accessed April 7, 2022].

¹⁷⁴ Ibid

¹⁷⁵ Zhang, S. et al., 2020. China in Global Wind Power Development: Role, status and impact. *Renewable and Sustainable Energy Reviews*. Available at: <https://www.sciencedirect.com/science/article/pii/S136403212030174X> [Accessed April 7, 2022].

¹⁷⁶ Ibid

¹⁷⁷ Zheng, H., Song, M. & Shen, Z., 2021. The evolution of renewable energy and its impact on carbon reduction in China. *Energy*. Available at: <https://www.sciencedirect.com/science/article/pii/S0360544221018879> [Accessed April 7, 2022].

biggest part of China's energy mix. It is evident that there are great efforts to be made, to transition from the traditional Chinese energy system of heavy carbon emissions to a less pollutive structure based on clean and renewable energy. There is also the issue to be tackled of whether this transition will indeed cut off the greenhouse gas emissions.¹⁷⁸ Whether the deployment of renewables will indeed reform the traditional energy structure or will it just be another available type of energy ready to be disposed alongside the existing fossil fuel consumption.

The relation between the growth of renewables and greenhouse gas emissions is intriguing indeed.¹⁷⁹ Menyah and Wolde, conducted a study which explored the causal relationship between carbon dioxide emissions and renewable and nuclear energy consumption.¹⁸⁰ Using the Granger causality test, the paper examined the hypothesis that renewables and nuclear would reduce greenhouse emissions.¹⁸¹ What they found was that there is no causality between greenhouse gas emissions and renewable energy.¹⁸² Along the same line of thinking, Jebli and Youssef, also concluded, in their research, that there were no significant effects between renewables and pollutant emissions.¹⁸³ Additionally, a study conducted by Kahia also indicated that clean forms of energy have no "prominent influence of carbon emissions".¹⁸⁴ Jiang et al. focusing on the case of China as the world's carbon emission leader, focused on the development of renewables and found out that there is little to no implications between them thus concluding that China cannot simply rely on improving its renewables to achieve its environmental and energy goals.¹⁸⁵

Another school of thought regarding the relationship between greenhouse emissions and renewables supports the partial relation and those renewables need to account for a certain threshold within the energy mix in order to be of any significance.¹⁸⁶ More specifically, Chiu, within his work

¹⁷⁸ Ibid

¹⁷⁹ Ibid

¹⁸⁰ Menyah, K. & Wolde-Rufael, Y., 2010. CO2 emissions, Nuclear Energy, renewable energy and economic growth in the US. *Energy Policy*. Available at:

<https://www.sciencedirect.com/science/article/pii/S0301421510000303> [Accessed April 7, 2022].

¹⁸¹ Zheng, H., Song, M. & Shen, Z., 2021. The evolution of renewable energy and its impact on carbon reduction in China. *Energy*. Available at:

<https://www.sciencedirect.com/science/article/pii/S0360544221018879> [Accessed April 7, 2022].

¹⁸² Ibid

¹⁸³ Jebli, M.B. & Youssef, S.B., 2015. The environmental Kuznets curve, economic growth, renewable and non-renewable energy, and trade in Tunisia. *Renewable and Sustainable Energy Reviews*. Available at:

<https://www.sciencedirect.com/science/article/pii/S1364032115001379> [Accessed April 7, 2022].

¹⁸⁴ Kahia, M., Aïssa, M.S.B. & Lanouar, C., 2017. Renewable and non-renewable energy use - economic growth Nexus: The case of MENA net oil importing countries. *Renewable and Sustainable Energy Reviews*. Available at: <https://www.sciencedirect.com/science/article/pii/S1364032117300114> [Accessed April 7, 2022].

¹⁸⁵ Zheng, H., Song, M. & Shen, Z., 2021. The evolution of renewable energy and its impact on carbon reduction in China. *Energy*. Available at:

<https://www.sciencedirect.com/science/article/pii/S0360544221018879> [Accessed April 7, 2022].

¹⁸⁶ Ibid

utilized a model of study to explore this threshold effect and the proportion of renewables in the OECD member states. With this model, he concluded that this specific threshold of renewables is the number 8.3889% of the total energy supply of a country.¹⁸⁷ Apergis et al, with their studies showed that *“renewable energy did not reduce carbon emissions, with one possible reason being that the share of renewable energy consumption in these countries was still small at that time or that these countries had not reached the critical point where renewable energy had begun to reduce carbon emissions”*.¹⁸⁸

In another work of his, Apergis et al, using panel data in order to link renewable energy and per capita carbon emissions, found out that renewable energy actually helps in reducing emissions.¹⁸⁹ More specifically, they pointed out that *“in the long-run, renewable energy consumption reduces carbon emissions”*.¹⁹⁰ For China specifically, Chen et al, conducted a study pointing out that renewable energy could indeed reduce the development of carbon emissions.¹⁹¹ Sovacool et al, provided an analysis of the relationship between renewable energy, nuclear energy and carbon emissions. They pointed out that large scale nuclear energy would not be a factor of emissions reduction whereas renewables could be pivotal in reducing them.¹⁹²

In reality, the coal sector in China is massive. This sector alone “employs 7.8million people and produces about 40 percent of the world’s coal”.¹⁹³ Indeed we can begin to identify a certain kind of paradox on China’s energy practices and its climate politics.¹⁹⁴ Is China cutting or supporting coal and fossil fuels? The truth is, as previously pointed out, China continues its large investments on clean and renewable energy. The scale of some of these investments portray the will and necessity of the shifting on energy production and consumption. In that sense, China is moving towards a more ‘green and clean energy path’.

¹⁸⁷ Ibid

¹⁸⁸ Ibid

¹⁸⁹ Apergis, N., Jebli, M.B. & Youssef, S.B., 2018. Does renewable energy consumption and health expenditures decrease carbon dioxide emissions? evidence for sub-saharan africa&countries. Renewable Energy. Available at: <https://www.sciencedirect.com/science/article/pii/S0960148118305640> [Accessed April 7, 2022].

¹⁹⁰ Ibid

¹⁹¹ Chen, Y., Wang, Z. & Zhong, Z., 2018. CO2 emissions, economic growth, renewable and non-renewable energy production and foreign trade in China. Renewable Energy. Available at: <https://www.sciencedirect.com/science/article/pii/S0960148118308449> [Accessed April 7, 2022].

¹⁹² Sovacool, B.K. et al., 2020. Differences in carbon emissions reduction between countries pursuing renewable electricity versus Nuclear Power. Nature News. Available at: <https://www.nature.com/articles/s41560-020-00696-3>. [Accessed April 7, 2022].

¹⁹³ Chen, Y., Wang, Z. & Zhong, Z., 2018. CO2 emissions, economic growth, renewable and non-renewable energy production and foreign trade in China. Renewable Energy. Available at: <https://www.sciencedirect.com/science/article/pii/S0960148118308449> [Accessed April 7, 2022].

¹⁹⁴ Green, N. & Kryman, M., 2014. The political economy of China's energy and climate paradox. Energy Research & Social Science. Available at: <https://www.sciencedirect.com/science/article/pii/S221462961400111X> [Accessed April 7, 2022].

To try and understand the complexity of the Chinese energy transition, Xu utilized the multi-level perspective (MLP) as introduced by Sovacool and Geel to deconstruct and further understand the case.¹⁹⁵ Because of this energy transition, *“just like any important social and economic changes, a substantial change in energy structure involves many trade-offs, challenges.”*¹⁹⁶ Despite the ongoing energy revolution, there is still evidence regarding the curtailment of renewable energy.¹⁹⁷ Examples of such would be the “reduction in the output of a wind, solar or hydropower generator from what it could otherwise produce given the available resources”.¹⁹⁸ This curtailment is mostly identified via lack of *“over-generation, lack of access and lack of transmission”*.¹⁹⁹ This curtailment could also be seen as directly opposing the deployment of renewables and holding back the transition.

The immense energy projects and installations China has produced also contradict the lesser usage of renewables. It was shown that in 2015, *“the total amount of wind and photovoltaic energy curtailment was 38.6 billion kWh and the average rate of energy curtailed was 14.6”*.²⁰⁰ Furthermore, the energy produced from wind power decreased from 1920 h in 2011 to 1742 in 2016.²⁰¹ Photovoltaic power utilization also decreased from 1368 h in 2013 to 1133 h in 2015.²⁰² In 2018 respectively, “the curtailment amount of hydropower, wind power and photovoltaic power was 69.1, 27.7, and 5.49”²⁰³. Despite the economic losses of the under-utilization of renewables projects, which are immense nevertheless, this curtailment promotes the issue of more fossil fuel energy being utilized.

Returning to the MLP framework, Sovacool pointed out the vital elements needed to eliminate this paradoxical state between renewables and economic growth and to accomplish such an energy transition, as China is attempting. The first element is the *“importance of the socio-institutional dynamics and second the techno-economic dimensions and positive ‘environment selection’ that comprises the policies and regulations that are necessary to activate and maintain a low-carbon transition”*.²⁰⁴ This is why there is emphasis given on the conflicting nature of the strategic goals of the central government and the interests of local communities, as also shown with the practices regarding

¹⁹⁵ Sovacool, B.K. & Geels, F.W., 2016. Further reflections on the temporality of Energy Transitions: A response to critics. *Energy Research & Social Science*. Available at: <https://www.sciencedirect.com/science/article/pii/S2214629616301967> [Accessed April 7, 2022].

¹⁹⁶ Xu, S., 2020. The paradox of the Energy Revolution in China: A socio-technical transition perspective. *Renewable and Sustainable Energy Reviews*. Available at: <https://www.sciencedirect.com/science/article/pii/S1364032120307553> [Accessed April 7, 2022].

¹⁹⁷ Ibid

¹⁹⁸ Ibid

¹⁹⁹ Ibid

²⁰⁰ Ibid

²⁰¹ Ibid

²⁰² Ibid

²⁰³ Ibid

²⁰⁴ Ibid

subsidies. Because *“the attitude of local governments towards national energy norms and policies deeply affects the path and velocity of energy transition”*.²⁰⁵

Nevertheless, the paradoxical nature of the energy transition and the practices of the energy sector is at the forefront of the challenges China is facing. There is a need to critically approach the Chinese energy revolution in essence. As actions speak for themselves, it would be foolish not to observe that the driving forces of the decision making regarding this political and energy agenda are not solely cutting down on greenhouse emissions, strengthening renewables and being at the forefront of technological innovation. One could argue that the essence of this energy revolution is driven based on economic growth, industrial investment and even creating a place of dominance for China in the upcoming geopolitical games of renewables, which the whole globe is turning to because of environmental degradation and climate change. With this immense economic growth and energy demand, China has increasingly become more aware about its potential energy security problems.

3.2 Energy transition in the USA

The second case study in examination is that of the USA. As the west’s largest economy, in terms of GDP, and the worlds’ second largest carbon emitter, the USA has now positioned itself at the forefront of combating climate change. Via initiatives such as the Green New Deal (GND) and provisions expressed by the Paris Agreement, the US is actively trying to reduce greenhouse gas emissions and eventually minimize its dependence on fossil fuels.

Historically, *“the energy sector of the United States is one of significant change, three fossil fuel sources (petroleum, natural gas, and coal) have made up at least 80% of total U.S. energy consumption for more than 100 years”*.²⁰⁶ Those three fossil fuels have made up the majority of the USA’s energy mix and shall continue to do so in the near future. Before the “fossil fuel era”, wood was the most commonly used energy source.²⁰⁷ *“Coal became dominant in the late 19th century before being overtaken by petroleum products in the middle of the 20th century, a time when natural gas usage also rose quickly”*.²⁰⁸ Coal usage increased again by the mid-20th century, mainly because of its

²⁰⁵ Ibid

²⁰⁶ EIA Staff. “Fossil Fuels Have Made up at Least 80% of U.S. Fuel Mix since 1900”. Homepage - U.S. Energy Information Administration (EIA), U.S. Energy Information Administration, 2 July 2015, <https://www.eia.gov/todayinenergy/detail.php?id=21912#:~:text=Fossil%20fuels%20have%20made%20up,U.S.%20fuel%20mix%20since%201900&text=While%20the%20energy%20history%20of,for%20more%20than%20100%20years>.

²⁰⁷ Melosi, Martin V. “Energy and Environment in the United States: The Era of Fossil Fuels.” Environmental Review: ER, vol. 11, no. 3, 1987, pp. 167–88. JSTOR, <https://doi.org/10.2307/3984086>. Accessed 18 Jun. 2022.

²⁰⁸ EIA Staff. “Fossil Fuels Have Made up at Least 80% of U.S. Fuel Mix since 1900”. Homepage - U.S. Energy Information Administration (EIA), U.S. Energy Information Administration, 2 July 2015, <https://www.eia.gov/todayinenergy/detail.php?id=21912#:~:text=Fossil%20fuels%20have%20made%20up,U.S>

role as the main source of energy used to generate electricity.²⁰⁹ Renewable energy sources began to appear in the US's energy mix in the 1980's and have drastically increased since then.²¹⁰ "In 2021, renewable energy sources accounted for about 12.2% of total U.S. energy consumption and about 20.1% of electricity generation".²¹¹ Nevertheless, fossil fuels remain the dominant source of energy occupying most of the US's energy mix.

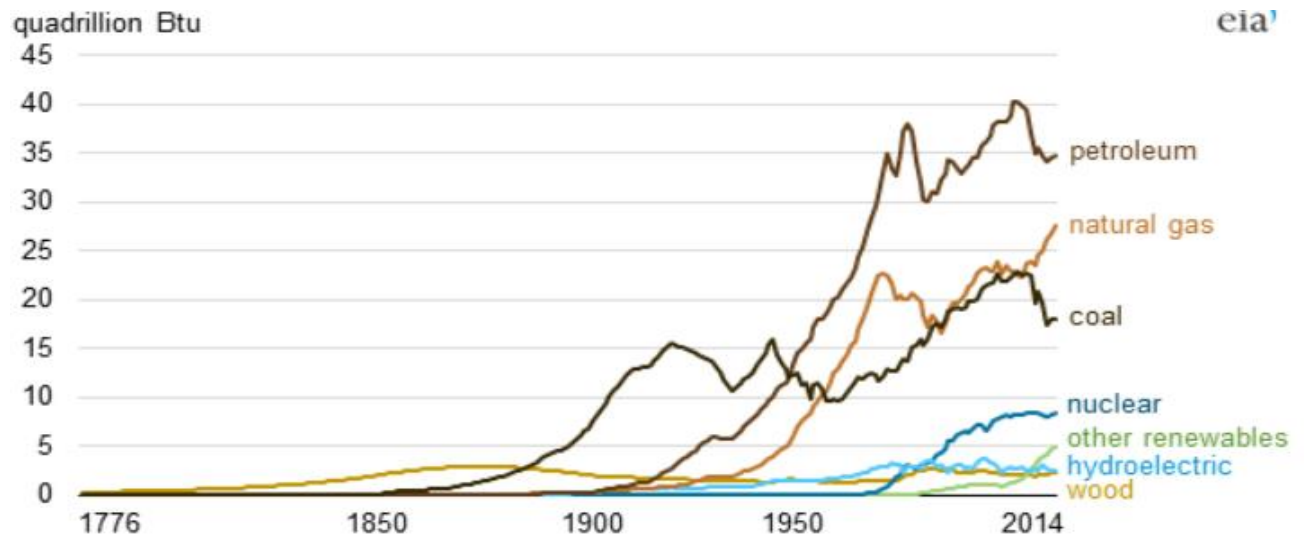


Figure 2. Energy consumption in the United States (1776-2014)

Source: (U.S. Energy Information Administration, Monthly Energy Review)

With the increasing worldwide concerns about climate change and switching to more sustainable forms of energy, the more recent US administrations have actively begun to take measures to combat extensive fossil fuel usage. Re-admitting to the Paris Agreement initiative and introducing the 'Green New Deal' as previously mentioned, are not the sole decision made by the Biden-Harris administration. Additionally, projects such as the 'Energy Transitions Initiative Partnership Project' (ETIPP) also aim to provide a cleaner and more resilient energy future.

.%20fuel%20mix%20since%201900&text=While%20the%20energy%20history%20of,for%20more%20tha
n%20100%20years.

²⁰⁹ Ibid

²¹⁰ Ibid

²¹¹ EIA Staff. "Frequently Asked Questions (FAQ's) - U.S. Energy Information Administration (EIA)." Frequently Asked Questions (FAQs) - U.S. Energy Information Administration (EIA), 13 May 2021, <https://www.eia.gov/tools/faqs/faq.php?id=92&t=4#:~:text=In%202021%2C%20renewable%20energy%20sources,about%2020.1%25%20of%20electricity%20generation.>

*“The Green New Deal, as introduced to the U.S. Congress in 2019 by Representative Alexandria Ocasio-Cortez and Senator Ed Markey, is an aspirational, visionary resolution, rather than a prescriptive piece of legislation”*²¹². The motive and aim of such a political agenda are to appoint the government as the necessary political entity needed to engage and deliver a ‘just transition’ and not rely on the industry and the market.²¹³ Additionally, the GND alongside this ‘just transition’ advocates for the reduction in greenhouse emissions which will also have a part in delivering this ‘just transition’.²¹⁴ Another essential component of a ‘just transition’, according to provisions of the GND is that *“worker and community-led efforts are fundamental to delivering the promises of a GND and a just post-carbon world”*.²¹⁵ The spirit of GND opts for *“placing the well-being of people over profits”*.²¹⁶ Presidential candidate Bernie Sanders, published a thirty page document, titled ‘The Green New Deal’, in which he outlined his political plan regarding this transformation of the existing energy system and to move away from fossil fuels and transition to more ‘clean’ and sustainable forms of energy.²¹⁷ Some of the key points presented in the document are the declaration of climate change as a national emergency, *“reaching 100 percent renewables for the electricity and transportation sector by no later than 2030 and a complete decarbonization by at least 2050”*.²¹⁸ Despite his defeat in the presidential elections, it is evident that contemporary US politics are vastly concerned with the matters discussed above.

Joe Biden hastily readmitted the US into the Paris Agreement. The Biden administration has made clear that it supports this *“unprecedented framework for global action”*.²¹⁹ Further actions taken by this administration, supporting the claim above, are the *“commitment of the private sector of over \$100 billion in new private capital to make electric vehicles and batteries in the United States”*.²²⁰ In addition, numerous investments are set to take place such as the deployment of solar panels,

²¹² Cha, J. Mijin, et al. “A Green New Deal for All: The Centrality of a Worker and Community-Led Just Transition in the US.” *Political Geography*, Pergamon, 13 Jan. 2022, <https://www.sciencedirect.com/science/article/pii/S0962629822000087#!>

²¹³ Ibid

²¹⁴ Ibid

²¹⁵ Ibid

²¹⁶ Ibid

²¹⁷ The Green New Deal. Bernie Sanders Official Website, Friends of Bernie Sanders, <https://berniesanders.com/issues/green-new-deal/>.

²¹⁸ Ibid

²¹⁹ Blinken, Antony J. “The United States Officially Rejoins the Paris Agreement - United States Department of State.” U.S. Department of State, U.S. Department of State, 26 Feb. 2021, <https://www.state.gov/the-united-states-officially-rejoins-the-paris-agreement/#:~:text=The%20Paris%20Agreement%20is%20an,climate%20change%20we%20already%20see.>

²²⁰ Fact Sheet: President Biden Takes Bold Executive Action to Spur Domestic Clean Energy Manufacturing. The White House, The United States Government, 6 June 2022, <https://www.whitehouse.gov/briefing-room/statements-releases/2022/06/06/fact-sheet-president-biden-takes-bold-executive-action-to-spur-domestic-clean-energy-manufacturing/>.

empowering the existing power grid and bolstering its infrastructure and strengthening the made-in-America clean energy production.²²¹

Furthermore, President Biden did also sign a ‘Bipartisan Infrastructure Law’ (BIL). This political action plan, which was passed as law, includes provisions regarding the development of *“America’s roads, bridges and rails, expand access to clean drinking water, ensure every American has access to high-speed internet, tackle the climate crisis, advance environmental justice, and invest in communities that have too often been left behind”*.²²² More specifically, regarding the energy sector, a \$7.5 billion investment in Electric Vehicle (EV) chargers. Creating a national system and network that will facilitate even further the adoption of EVs, thus reducing carbon emissions and air pollution.²²³ Another key point of this law is investing and further developing the existing infrastructure and energy grid. Adding new lines of transmission and expanding the US’s energy mix with clean and more efficient forms of energy.²²⁴ The ‘Bipartisan Infrastructure Law’ in collaboration with the National Park Service also introduced *“the largest investment in tackling legacy pollution in American history”*.²²⁵ Funded by the BIL, the National Park Service has been appointed to *“remediate and reclaim abandoned oil and gas well sites in national parks”*.²²⁶

Despite the above-mentioned endeavors in transitioning to a cleaner and more sustainable energy future, the facts and figures show that the US is the prime global oil producer with a production of 11.660 thousand barrels per day, as of February 2022.²²⁷ This has been evident since the ‘Shale Gas Revolution’ and the technological breakthrough of combining drilling with ‘hydraulic fracturing’ creating the ‘fracking’ method²²⁸. *“The volumes of petroleum and natural gas hydrocarbons produced in the United States in 2015 were the largest in the world”*, surpassing that of Russia.²²⁹ Alongside oil, this method also allows for the extraction of natural gas. *“Fracking involves pumping a water or a chemical mixture typically containing sand into a deposit at high pressure fracturing the rock in a formation that has been directionally drilled”*.²³⁰ With these elements in place, in combination with

²²¹ Ibid

²²² President Biden's Bipartisan Infrastructure Law. The White House, The United States Government, 2 Dec. 2021, <https://www.whitehouse.gov/bipartisan-infrastructure-law/#electricvehicle>.

²²³ Ibid

²²⁴ Ibid

²²⁵ Ibid

²²⁶ Ibid

²²⁷ PETROLEUM & OTHER LIQUIDS. U.S. Field Production of Crude Oil (Thousand Barrels per Day), U.S. Energy Information Administration, 31 May 2022,

<https://www.eia.gov/dnav/pet/hist/LeafHandler.ashx?n=PET&f=M&s=MCRFPUS2>

²²⁸ Davis, Lance A. “The Shale Oil and Gas Revolution.” Engineering, Elsevier, 3 July 2018,

<https://www.sciencedirect.com/science/article/pii/S2095809918306167>.

²²⁹ Ibid

²³⁰ Davis, Lance A. “The Shale Oil and Gas Revolution.” Engineering, Elsevier, 3 July 2018,

<https://www.sciencedirect.com/science/article/pii/S2095809918306167>.

the lifting of the 40-year-old ban in crude oil exports, the US has taken a central role in the international oil and natural gas market, becoming the third largest exporter in the world and subsequently diversifying the global supply away from the Middle East.²³¹

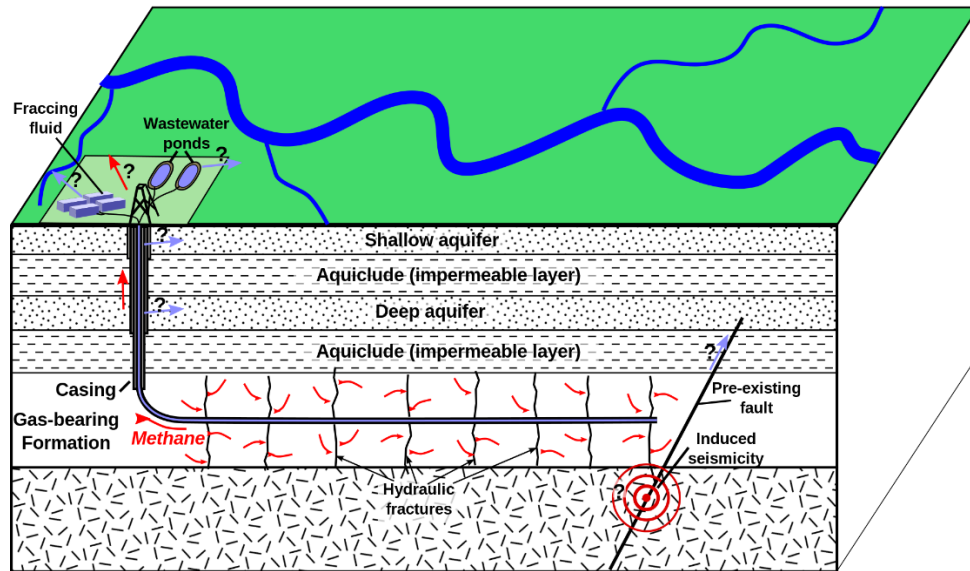


Figure 3. Schematic depiction of hydraulic fracturing

Source: (Xie, Jueren. “Finite Element Analysis of Casing and Casing Connections for Shale Gas ...”)

With this technological breakthrough, the US is now a global oil and gas producer and a key exporter for the rest of the world. Moreover, due to the expansion of domestic production, oil and gas imports have been steadily decreasing.²³² Furthermore, the US has achieved a reduction of its energy dependence on foreign energy.²³³ Another point worth mentioning is the fact that alongside the ‘shale revolution’ natural gas became also more affordable. With prices decreasing in natural gas, electricity production has also begun transitioning from coal to natural gas. It was because of the excess oil production, the US transitioned from an oil importer to an exporter. Hence as it can be understood, there is a lot of progress to be made in deploying renewables in the total energy mix of the US. Petroleum and natural gas amass for more than two thirds of total energy consumption as of 2021. Those fossil fuels also bring the US and companies lots of revenue. With oil and gas amounting for almost 8% of the total GDP of the US with the largest companies of the sector earning almost

²³¹ Langer, Lissy, et al. “Lifting the US Crude Oil Export Ban: A Numerical Partial Equilibrium Analysis.” *Energy Policy*, Elsevier, 29 July 2016, <https://www.sciencedirect.com/science/article/pii/S0301421516303986>.

²³² Gecan, Ron, et al. “The Economic and Budgetary Effects of Producing Oil and Natural Gas From Shale.” *Congressional Budget Office*, Dec. 2014, <https://www.cbo.gov/sites/default/files/113th-congress-2013-2014/reports/49815-effectsofshaleproduction.pdf>.

²³³ Ibid

\$100bn in combined profits.²³⁴ Evidently these developments on the oil and natural gas sector can be seen as contradictory in regards to the energy transition agenda and the path towards cleaner energy, similarly to the case of China.

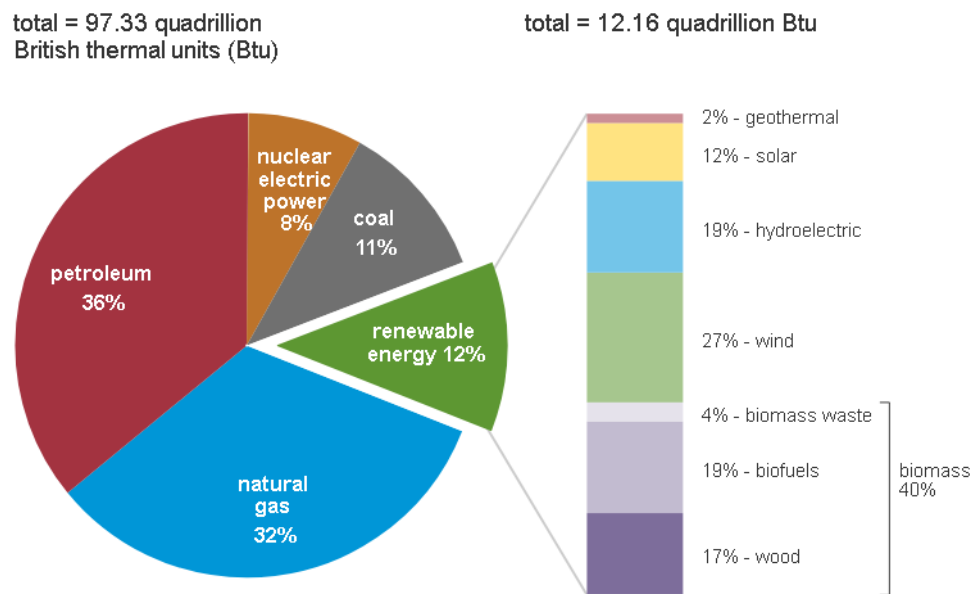


Figure 4. U.S. primary energy consumption by energy source (2021)

Source: (U.S. Energy Information Administration, Monthly Energy Review, April 2022)

3.3 Towards energy democracy: The case of Bhutan

In this section of the paper, I shall focus on the alternative and intriguing case of Bhutan. The first country ever to not only be carbon neutral, but carbon negative. Meaning that the forests of Bhutan, soak and convert more CO₂ to oxygen than what the whole country produces. Bhutan is located in the Himalayas and is the least populated country in South Asia. Bhutan is also the least-urbanized country in the world and most of its people live in the nation's valleys.

Bhutan opened its borders in 1960, as before it was a closed country that required much effort and legal paperwork in order to step foot on it, which deemed access almost impossible. From 1960 and onwards, Bhutan had entered a developmental state, introducing the people with the Five-Year Plan. A trend which continued as "*Bhutan has to date successfully completed four decades of planned*

²³⁴ OCI TEAM. "U.S. Oil and Gas Companies Set to Make Tens of Billions More from Wartime Oil Prices in 2022." <https://Priceofoil.org>, Oil Change International, 29 Mar. 2022, <https://priceofoil.org/2022/03/29/us-oil-and-gas-companies-set-to-make-tens-of-billions-more-from-wartime-oil-prices-in-2022/>.

development via eight Five-Year Development Plans".²³⁵ Since 1980, maximizing GNH has been a core philosophy of the developmental path Bhutan has chosen. *"GNH stresses differences between the concepts of wealth and prosperity, and highlights higher standards of living through moderate lifestyles."*²³⁶ GNH calls for a holistic approach towards multidimensional development and societal growth focusing on sustainable ways that seek to maintain harmony, maximize happiness and balance economic forces, environmental preservation, cultural and spiritual values and good governance with little dependence on global finite resources.²³⁷ More specifically, the Bhutanese government pointed out four main pillars of their developmental philosophy highlighting *"preservation and sustainable use of the environment, economic growth and development, preservation and promotion of cultural heritage and good governance"*.²³⁸

Interestingly, Bhutan's approach to societal development differs from the traditional western model focusing on economic growth and GDP. Instead, Bhutan has proposed alongside GDP two other indicators that reflect the goals of its sustainable development agenda. Those are GHG and GNH as previously mentioned. Those three goals are economic growth which is represented by GDP, maintaining a low level of carbon emissions which is represented by GHG and people's happiness which is represented by the GNH.²³⁹ Regarding economic growth, GDP has seen a growth rate of 7.6% from 2003 to 2016 and in the future years *"the growth trajectory in GDP projected by the Asian Development Bank seems to be very positive ranging from 6.6%, 6.8% to 7.4% depending on three alternative scenarios to 2030"*.²⁴⁰ Furthermore, Bhutan has pledged to remain carbon neutral along with several other countries. Only nine countries alongside Bhutan have achieved a state of carbon neutrality such as Monaco, Maldives and Iceland. This has been possible for Bhutan because of the landscape. The immense forest landscape covers about 70% of the land and is a natural carbon sink, as pointed out above.

The truth is, Bhutan conceptualizes societal development and growth fundamentally different than the 'West'. Being influenced by Buddhist ideals and approaches, GNH presents a form of governmentality that reflects the 'eastern' philosophical values of the spirit and soul as opposed to the physicality and materialism of the 'west'. The previously mentioned four pillars of the GNH do also reflect on the above, those being *"sustainable and equitable socio-economic development,*

²³⁵ Ibid

²³⁶ Ibid

²³⁷ Ibid

²³⁸ Ibid

²³⁹ Yangka, D. et al., 2018. Sustainability in an emerging nation: The Bhutan Case Study. MDPI. Available at: <https://www.mdpi.com/2071-1050/10/5/1622/htm> [Accessed April 7, 2022].

²⁴⁰ Ibid

preservation and promotion of culture, environmental conservation and good governance".²⁴¹ Within this line of thinking, this democratic constitution includes provisions not only regarding the functionality of the political sphere and government but also regarding "*psychological well-being, standard of living, health, education, cultural diversity and resilience and ecological diversity and preservation*".²⁴² School education in Bhutan is completely free and those who thrive are provided with free college education too. Healthcare is also provided by the state. This is because the Bhutanese remain true to their fundamentals of development with values. Remaining carbon neutral, the promise Bhutan has made, also falls under this scope of sustainable and equitable development with values. Initiatives such as clean Bhutan, green Bhutan and Bhutan for life also do follow this line of thinking of sustainable development.

To reflect on Bhutan and its forms of organization and development, renewables being the dominant energy source of the country, one could argue that this case presents an example of a country that has undergone a somewhat successful clean energy transition. But this process of transition is not over yet. The massive potential of hydropower in Bhutan still presents possibilities for the future, towards a more secure energy path for the country with less dependency on imports. Solar power also could play a huge role in the clean energy mix of Bhutan. The Himalayan terrain is promising as it has 300 sunshine days per year on average.²⁴³ Yet due to the lack of funding and investments and also land accessibility, this potential power supply has not yet been explored. Nevertheless, Bhutan, by diversifying its renewables could achieve independence from imports and secure its energy flows.

Taking the above into consideration, Bhutan is a country, newly opened to the world. A country in which democracy did not exist in the previous century. A country where cultural preservation, social and environmental sustainability and economic growth are its core values. A country that only recently adopted democracy, as a means of good governance and power to the people.²⁴⁴ Bhutan is a country that supports the wellbeing of its people with this more humane approach towards societal development and economic growth. Combining elements of sustainability regarding their environment with a strong sense of preservation of its pristine forests. Thus, Bhutan follows the same philosophy on its energy sector and practices. Sustainable and clean energy

²⁴¹ Ibid

²⁴² Ibid

²⁴³ Gulagi, A. et al., Renewable energy transition for the Himalayan countries Nepal and Bhutan: Pathways towards reliable, affordable and sustainable energy for all. IEEE Xplore. Available at: <https://ieeexplore.ieee.org/document/9448098>. [Accessed April 7, 2022].

²⁴⁴ Brooks, J.S., 2013. Avoiding the limits to growth: Gross National Happiness in Bhutan as a model for sustainable development. MDPI. Available at: <https://www.mdpi.com/2071-1050/5/9/3640/htm> [Accessed April 7, 2022].

comprises the majority of the country's energy mix, with biomass and hydropower being the most dominant. Thus, reinforcing their promise to the world to remain carbon neutral. *"99% of electricity generation in Bhutan is from hydro resources and the rest comes from diesel generating plants."*²⁴⁵ This allowed households to transition from using wood for cooking, heating and other household needs, which would lead to emissions reduction from burning this wood. Practices such as the state providing electricity, as aforementioned, and initiatives such as green and clean Bhutan which I also did make a mention of, seek to maintain and increase the quality of life for the Bhutanese people and increase the GNH.

The newly adopted democratic regime alongside the practices of the Bhutanese, regarding sustainable development, could provide useful insights of how an energy transition could potentially unfold. This case could present a potential example of the Bhutanese version of energy democracy. Despite no universally agreed definition of energy democracy, certain fundamental values of the idea do co-align with the reality of the Bhutanese. Needless to say, the first point of contention would be the existence of the two centralized state companies, the Druk Green Power Corporation and Bhutan Power Corporation. But based on the core value of good governance, these two corporations are working towards achieving sustainable energy for all and are not solely profit driven.²⁴⁶ In addition those centralized state entities are not operating with fossil fuels. In line with combating climate change, those state entities, as shown, are using clean energy. Furthermore, by not being profit driven, energy has not been transformed to a commodity. Instead, it is treated as a vital public good in order to maintain this path of development. The energy system in place is focused on meeting the needs of communities and the environment. Bhutan, as a country, embodies one of the definitions of energy democracy: resist, reclaim, restructure. They have resisted the profit driven agenda of large centralized state entities. The people have claimed the right to public access to energy and electrification, regardless of the high level of state ownership. Bhutan has also achieved a mode of structure of the energy sector that is based on clean and renewable sources and the practices of the sector work towards sustainable development and public well-being.

3.4 Discussion

Focusing mainly on the first two case studies presented, that of China and the US, it would be interesting to identify the similar practices both countries are following. Both countries, despite their engagement with the sustainable energy agenda, are not cutting down fossil fuel usage. The two largest greenhouse gas emitters have yet to take up the task to combat this problem and transition

²⁴⁵ Anon, 2009. Overview of energy policies of Bhutan. Available at: <https://eneken.ieej.or.jp/data/2598.pdf> [Accessed April 7, 2022].

²⁴⁶ Ibid

towards cleaner energy. As shown in the case of China, coal is key in meeting its energy demands and there are no signs of changing that in the near future. On the other side, the USA similarly has accepted climate change and the need for an energy transition as matters of high importance, they keep on producing, using and exporting large volumes of fossil fuels. Political attempts have also been made by the administrations to combat excessive fossil fuel usage and greenhouse gas emissions. Nevertheless, the US still retains the leading position as the biggest oil producer in the world.

Thus, it would be fair to question what exactly is the main goal of each country. A legitimate query is “Can really nations with contradicting interests find a productive composition of economic growth, environmental protection and peaceful coexistence?”

Approaching the matter through the lens of geopolitics might provide some valuable insight. The profitability of China’s industrial sector and the US’s oil sector respectively, are fundamental pillars on both countries’ societies and economies. Established systems such as those require massive efforts to substitute. In both cases, it can be argued that the shaking of the existing establishment might present a reformation in the global power structure thus leading to a potential loss of power. A loss of power that no country would be willing to submit to. As the long-lasting antagonism between the ‘east’ and the ‘west’ continues, the energy transition will have implications on the global order.

In essence, *“the geographic and technical characteristics of renewable energy systems are fundamentally different from those of coal, oil, and natural gas”*.²⁴⁷ Subsequently, the geopolitical implication of those fossil fuels is going to differ as compared to renewables. With renewables having inherently a more decentralized profile than fossil fuels, energy security concerns shall shift from focusing on energy sources to distribution.²⁴⁸ Also because of the higher availability and accessibility of renewable sources, the opportunity to decrease dependency on imports also arises, further empowering more secure energy supplies.

International competitiveness on the emerging market of renewables should be another point worthy of consideration. A study conducted by Shuai et al. shows that the US renewable energy products are the most competitive within the market, with China following after. On the other hand, China’s growth rate has exceeded that of any other country.²⁴⁹ China, with the deployment of massive renewable energy projects, is leading in the infrastructure sector whereas the US has the edge on

²⁴⁷ Scholten, Daniel, et al. “The Geopolitics of Renewables: New Board, New Game.” *Energy Policy*, Elsevier, 10 Feb. 2020, <https://www.sciencedirect.com/science/article/pii/S0301421519306469>.

²⁴⁸ Ibid

²⁴⁹ Shuai, Jing, et al. “Renewable Energy Product Competitiveness: Evidence from the United States, China and India.” *Energy*, Pergamon, 9 Mar. 2022, <https://www.sciencedirect.com/science/article/pii/S0360544222005175#sec5>.

technological innovation and system efficiency.²⁵⁰ To remain as competitive as possible China invested \$134.8 billion in sustainable forms of energy making it the largest investor for 2020.²⁵¹ The USA was the second largest investor, with \$85.3 billion.²⁵² It is apparent that a ‘race’ is taking place, in becoming the industry leader.

For China specifically, it could be that within this ‘Energy Revolution’ of China, lies the possibility of economic and geopolitical gains. This massive renewable deployment can provide grounds in which China could lead the world as the largest renewable energy generator. This situation presents immense economic and political potential to be found in an extremely dominant geopolitical position in the world. There is potential for China to be propelled as an industry leader on renewable energy. An example of that would be the rapid growth of electric vehicles. China could be trying to acquire as much market available and has successfully done so. To be exact, it was reported that 1.2 million units of EV were sold in 2019. In 2020, there were 3.3 million units sold. That alone gives a glimpse of the potential of the renewables market and China's effort to dominate it. Subsequently, as previously mentioned, China is also attempting to reduce energy dependency and provide secure streams of energy. As of now, China could be said to be ‘winning the race’ based on the fact that it’s *“the world’s largest producer of wind and solar energy, and the largest domestic and outbound investor of renewable energy”*.²⁵³

Table 3. Renewable energy investments of China and the US for 2020

Investment (billion \$)	China	USA
Total	\$134.8	\$85.3
Renewable energy capacity	\$83.6	\$49.3

Source: (Klačanský, Katharine. “Policy Paper: China vs. US: The Green Energy Race)

The geopolitical game of energy transition is indeed a vital component in the future of the world’s development. *“Renewables alter arenas of energy interaction, transforming markets and shifting trade partners, and reshape patterns of cooperation and conflict among countries”*.²⁵⁴ As with

²⁵⁰ Ibid

²⁵¹ Klačanský, Katharine. “Policy Paper: China vs. US: The Green Energy Race.” EUROPEUM.org, EUROPEUM, July 2021, <https://www.europeum.org/en/articles/detail/4310/policy-paper-china-vs-us-the-green-energy-race>.

²⁵² Ibid

²⁵³ Ibid

²⁵⁴ Overland, Indra, et al. “The Geopolitics of Renewables: New Board, New Game.” Energy Policy, Elsevier, 10 Feb. 2020, <https://www.sciencedirect.com/science/article/pii/S0301421519306469>.

conventional forms of energy, being regarded as a key component of influence for international relations, the same can be understood with renewable energy.²⁵⁵ The way countries shape their energy mix shall determine if they survive or not and shape their developmental path.²⁵⁶ There is huge potential for the shaking up of the existing bipolarity of China and the US, as created by oil and other fossil fuels.²⁵⁷

Europe alongside those two superpowers shall also try to gain ground in the international power and market share 'game'. *"The control over the technologies, which have to be developed further, and the division of the added value these technologies will generate, diminishing energy dependence and the impact on national development models"* are some key fields of contention amongst the great powers.²⁵⁸

Yet, the future remains unknown. Questions such as will the US adopt the Carter doctrine approach as they did in the Persian Gulf and other instances remain.²⁵⁹ In addition, will the transition to renewables promote a polarizing system between the superpowers of the world, much like how oil and fossil fuels did and will it be bipolar or multipolar, or will cooperation be consolidated to mark a new beginning in the world order?

²⁵⁵ Crikemans, David. "The Geopolitics of Renewable Energy: Different ... - Exploring Geopolitics." <https://Exploringgeopolitics.org>, University of Antwerp, 16 Mar. 2011, https://exploringgeopolitics.org/wp-content/uploads/2019/01/Crikemans_David_Geopolitics_Renewable_Energy.pdf.

²⁵⁶ Ibid

²⁵⁷ Ibid

²⁵⁸ Ibid

²⁵⁹ Overland, Indra, et al. "The Geopolitics of Renewables: New Board, New Game." *Energy Policy*, Elsevier, 10 Feb. 2020, <https://www.sciencedirect.com/science/article/pii/S0301421519306469>.

Chapter 4: Conclusions

4.1 Summary

With the included literature review and the case studies provided above, I attempted to raise evidence for the existing inequitable structure of the energy markets and the unfair treatment of energy. Considering it exclusively as a financial commodity and not as a vital public good, necessary for society to function. This is because the dominant fossil fuel-based system inherently reproduces inequality. The geographical distribution of natural resources and especially fossil fuels is naturally not even. Some countries are rich in oil, some in natural gas and others are unfortunate enough to have none. This is the fundamental reason behind the inequality of this system.

Those centralized energy systems that have developed over the years, originating from the first oil and energy companies, have led to the creation of national entities. These entities have been in charge of controlling and exploiting energy resources, as well as distributing energy, thus, accumulating wealth in addition to political and societal power. Such entities have increased their influence outside their national borders too. Furthermore, with such a key role as energy has in today's societies, those who are in control of the means of harvesting and distributing energy extend their power beyond this sector. This unequal and unbalanced treatment of energy, such as unequal distribution or malicious pricing, translates into political and social injustice.²⁶⁰ To add, this system is mostly aiming at increasing profits and often neglecting its accountability towards environmental deterioration and social stability and welfare. On the other hand, it must be stated that, there have been cases where these entities have also contributed to the stability of the energy market and to the security of supply. For example, before OPEC was formed in the 1960, oil prices were mostly formed based on supply and demand. Meaning that, if a country decided to double its oil production prices would fall and subsequently if a country decided to cut off its exports, prices would rise. This price fluctuation created an environment of insecurity and instability within the market.

This existing energy and, in extent, societal structure highlights the need for democratizing energy, to transform the currently established understanding of energy. On that same basis and reason, people have been arguing for an energy transition to happen. With no clear definition of the concept, energy transition could be perceived as the transformation of the existing energy sector

²⁶⁰ Sovacool, Benjamin K., et al. "Resolving Society's Energy Trilemma through the Energy Justice Metric." *Energy Policy*, Elsevier, 19 Sept. 2015, <https://www.sciencedirect.com/science/article/pii/S030142151530077X#s0010>.

structure from the centralized fossil fuel-powered entities to a decentralized system based on renewables. “Compared to fossil fuels, renewable energy offers many perceived advantages in addition to fuel switching, including the relative availability of distributed renewable resources, the access to and modularity of their enabling technologies, and the potential for new forms of ownership”.²⁶¹

Energy democracy, as a consequence, can be understood as a potential outcome of such a transition. With the same trait as energy transition, energy democracy has remained ill-defined with scholars providing different definitions and understandings depending on each. Some accepted principles of the concept are “*universal access to energy and social justice, switch to renewable and sustainable and local energy, public and social ownership over energy resources and infrastructure and democratize the energy sector with greater participation of the public*”²⁶². The above principles aim to create change, fight against social inequality and provide a more sustainable future for the energy sector.

Having discussed my main concepts, I then examined three case studies. The first case study being the intriguing case of China and its plans and efforts to increase sustainable energy production, cut extensive greenhouse emissions. President Xi Jinping engaged with such an agenda, calling China’s sustainable development strategy the “Green Dragon” or “Green Revolution”. The goal of this plan is to minimize and in later stages to completely cut off fossil fuel usage. It is believed that fossil fuel usage will peak in 2030 and by 2060 China has pledged to reach a net zero emissions. But as it stands, the reality is that China is the worlds’ leading country in greenhouse emissions and fossil fuel usage. This is because China has undergone immense industrial development and growth. This situation has created immense energy needs in order to support this growth and is mostly met via coal and other fossil fuels.

Ultimately, creating a situation where this industrial and economic growth encourages “dirty” fossil fuel-based energy which is in direct contradiction with the attempt to deploy the “Green Revolution” plan. This case presents useful insights on how the established fossil fuel-based energy system that is in place might not be able to coexist in a world where many countries seek to transition

²⁶¹ ²⁶¹ Burke, Matthew J., and Jennie C. Stephens. “Political Power and Renewable Energy Futures: A Critical Review.” *Energy Research & Social Science*, Elsevier, 15 Nov. 2017, <https://www.sciencedirect.com/science/article/pii/S2214629617303468?via%3Dihub#sec0015>.

²⁶² Veelen, B.van & Horst, D.van der, 2018. What is energy democracy? connecting social science energy research and political theory. *Energy Research & Social Science*. Available at: <https://www.sciencedirect.com/science/article/pii/S2214629618306261> [Accessed April 7, 2022].

into more sustainable forms of energy. Simply, the sheer volume of energy needed to funnel industries cannot be met with the current available volume of renewables.

The second case study being examined is that of the USA. Interestingly enough and similarly to China, the USA has also put climate change and energy sustainability and security on the forefront of its political agenda. The recent administrations have made clear attempts regarding the transition of the US's energy systems with the introduction of the GND and its participation in the Paris Agreement. Contradicting all the above, the USA is the world's largest oil producer as a consequence of the 'shale revolution'. This technological breakthrough has increased the production capacity resulting in decreased oil import dependency and providing more secure supplies of energy. Additionally, this excess oil production has provided the USA with a vital economic boost in a time of recovery from the recession of 2008.

The third case study in discussion is that of Bhutan. This interesting case study presents a structure of a country that could be close in achieving or already having achieved a type of energy democracy. To add, Bhutan's societal development and growth drastically differs from the dominant Western profit driven structure. As Bhutan is a 'new' democracy, in the recently introduced "Constitution of Bhutan" there are provisions including a new metric called Gross National Happiness to operate alongside GDP. The goal of this metric is to measure the happiness of the people. Within this newly formed constitution additional provisions are included regarding the preservation of Bhutan's' pristine environment and ecosystems. An example of that is the national forest policy which outlines those forests must be covering up to 60% of the land. Nevertheless, critiques regarding GNH have also been present. More specifically the 72 variables, in which the metric is based, have been in question as well as how accurately it reflects the well-being of the people.²⁶³

This mode of structure chosen by Bhutan, does not indicate that it wishes for its people to live in poverty, but combines economic growth alongside sustainable development. Indeed, Bhutan has identified the need for a harmonious coexistence between economic growth and sustainable development. This is why the Bhutanese do not use GDP as the sole metric of evaluating the developmental performance of the country. Additionally, national programs such as "Sustainable Energy for All" promote the democratization of energy sources and its distribution. Within this newly adopted democracy the country has implemented a constitution with strict provisions regarding sustainability of societal development. Bhutan respects its natural resources but equally respects

²⁶³ Fishman, Ram Mukul. "Gross National Happiness — A Real Alternative or a Romantic Wish? Impressions from the Fourth International Conference on Gross National Happiness in Bhutan." *Consilience*, no. 3, 2010, pp. 179–86. JSTOR, <http://www.jstor.org/stable/26167794>. Accessed 25 Jun. 2022.

economic growth and social welfare. It's a country that presents an alternative mode of development and could potentially inspire other countries through its spirit of sustainability and good governance. An example that shows people can live and be happy without excessive but adequate amounts of money, combining sustainability and economic development.

4.2 Concluding remarks

Sustainable development and energy practices have been of paramount importance in the last decade and shall continue to be at the forefront of the political agendas of most countries. The issue of climate change and excessive greenhouse emissions have highlighted the need for a fundamental transition of the world's energy practices, from generation to consumption. Additionally, the literature explored suggested that there is an inherently unjust and undemocratic system under which the energy sector operates. Giant centralized entities, which are dominated by the established fossil fuel energy system, often called 'national champions', endorse this idea of state control over the market chain of energy and its products. To break this cycle of resource control and power relations, ideas such as 'energy democracy' and 'energy transition' have been introduced. With no clear and universally accepted definition, Energy democracy presents a potential future in which the decision-making process of energy practices is not solely based on profit-driven actions. Instead, the aim would be to provide secure and just flows of energy to the people as a whole. Eliminating the possibility of one not having electricity because of high bills or no heating for the same reason. Additionally, sustainable forms of energy are a core pillar of both the energy transition and for energy democracy. Another major problem being identified is the degradation of the environment and climate change.

To combat problems of such, renewable energy sources present a possible solution for the future, despite the numerous challenges that might be presented from deploying such energy sources. 'Energy transition' also advocates for a shift from the fossil fuel practices and the centralized entities, as said. Abolishing such a system would also shake up the societal structure. Having few actors in the process of production and distribution, granted them immense social and political power. Energy democracy supports the cut down of such national champions and transition from fossil fuels to a system of decentralized, publicly owned renewables. Moving from profit driven practices towards actually meeting societies and people's needs along with protecting the environment. Energy within this context is understood as a fundamental pillar in creating just and equitable societies where ordinary people participate in the decision-making process.

Understandably, the idea of energy transition presents a potential pathway in which energy democracy could be unfolded. Alongside that, technological innovation and political reformation are key elements to the transition and provide grounds on which energy democracy can flourish. These

two elements can allow renewables to penetrate the energy mix on a higher scale but also provide ways in which there can be decentralized and public power generation. Consequently, as mentioned before, this will shake up the existing forms and power relations within society and move away from the existing dependency of the public on the state authorized energy entity. Furthermore, individuals this way, can potentially have more secure supplies of energy as each one generates their own power and in case of overgeneration an individual can maybe sell the excess power generated, tackling even further the huge problem of energy security upon supply. Nevertheless, it is true that we are facing an environmental, financial and energy emergency. The need for a shift in our contemporary energy practices is more apparent than ever as extreme weather conditions of all sorts have become more frequent and damaging. Whatever the optimal solution to these problems may be, it is important that we waste no further time and begin to answer these questions today. As dramatic as it may sound, the future of the next generations rests in our hands but our minds also. How we treat this environmental disease will determine our livelihood for the years to come.

References

1. Adams, Samuel, and Christian Nsiah. "Reducing Carbon Dioxide Emissions; Does Renewable Energy Matter?" *Science of The Total Environment*, Elsevier, 22 July 2019, <https://www.sciencedirect.com/science/article/pii/S0048969719332073>.
2. Apergis, Nicholas, et al. "Does Renewable Energy Consumption and Health Expenditures Decrease Carbon Dioxide Emissions? Evidence for Sub-Saharan & African Countries." *Renewable Energy*, Pergamon, 14 May 2018, <https://www.sciencedirect.com/science/article/pii/S0960148118305640>.
3. Bauwens, Thomas, et al. "Conceptualizing Community in Energy Systems: A Systematic Review of 183 Definitions." *Renewable and Sustainable Energy Reviews*, Pergamon, 18 Dec. 2021, <https://reader.elsevier.com/reader/sd/pii/S1364032121012624?token=EB6107BCE811799423B85962850B295422E08C2613C581B0BABFF94FA9E06A7BB8E3EF5CEA01306DA401A69E96648B29&originRegion=eu-west-1&originCreation=20220110153214>.
4. Blazquez, Jorge, et al. "On Some Economic Principles of the Energy Transition." *Energy Policy*, Elsevier, 16 Sept. 2020, <https://www.sciencedirect.com/science/article/pii/S0301421520305267>.
5. Blinken, Antony J. "The United States Officially Rejoins the Paris Agreement - United States Department of State." U.S. Department of State, U.S. Department of State, 26 Feb. 2021, <https://www.state.gov/the-united-states-officially-rejoins-the-paris-agreement/#:~:text=The%20Paris%20Agreement%20is%20an,climate%20change%20we%20already%20see>.
6. Bommel, Natascha van, and Johanna I. Höffken. "Energy Justice within, between and beyond European Community Energy Initiatives: A Review." *Energy Research & Social Science*, Elsevier, 19 June 2021, <https://www.sciencedirect.com/science/article/pii/S2214629621002504>.
7. BP Statistical Review of World Energy 2020. <https://www.bp.com/content/dam/bp/business-sites/en/global/corporate/pdfs/energy-economics/statistical-review/bp-stats-review-2020-full-report.pdf>.
8. Brooks, Jeremy S. "Avoiding the Limits to Growth: Gross National Happiness in Bhutan as a Model for Sustainable Development." MDPI, Multidisciplinary Digital Publishing Institute, 26 Aug. 2013, <https://www.mdpi.com/2071-1050/5/9/3640/htm>.
9. Burke, Matthew J., and Jennie C. Stephens. "Political Power and Renewable Energy Futures: A Critical Review." *Energy Research & Social Science*, Elsevier, 15 Nov. 2017, <https://www.sciencedirect.com/science/article/pii/S2214629617303468?via%3Dihub#sec0015>.
10. Byrne, John, et al. "Relocating Energy in the Social Commons: Ideas for a Sustainable Energy Utility - John Byrne, Cecilia Martinez, Colin Ruggero, 2009." SAGE Journals, Sage Publications, Apr. 2009, <https://journals.sagepub.com/doi/10.1177/0270467609332315>.
11. Caramizaru, E. and Uihlein, A., *Energy communities: an overview of energy and social innovation*, EUR 30083 EN, Publications Office of the European Union, Luxembourg, 2020, ISBN 978-92-76-10713-2, doi:10.2760/180576, JRC119433.

12. Cha, J. Mijin, et al. "A Green New Deal for All: The Centrality of a Worker and Community-Led Just Transition in the US." *Political Geography*, Pergamon, 13 Jan. 2022, <https://www.sciencedirect.com/science/article/pii/S0962629822000087#!>
13. Chen, Yulong, et al. "CO2 Emissions, Economic Growth, Renewable and Non-Renewable Energy Production and Foreign Trade in China." *Renewable Energy*, Pergamon, 12 July 2018, <https://www.sciencedirect.com/science/article/pii/S0960148118308449>.
14. Ciptet, David. "From Energy Privilege to Energy Justice: A Framework for Embedded Sustainable Development." *Energy Research & Social Science*, Elsevier, 16 Apr. 2021, <https://www.sciencedirect.com/science/article/abs/pii/S221462962100089X>.
15. Davis, Lance A. "The Shale Oil and Gas Revolution." *Engineering*, Elsevier, 3 July 2018, <https://www.sciencedirect.com/science/article/pii/S2095809918306167>.
16. Duan, Hongbo, et al. "Achieving China's Energy and Climate Policy Targets in 2030 under Multiple Uncertainties." *Energy Economics*, North-Holland, 24 Dec. 2017, <https://www.sciencedirect.com/science/article/pii/S0140988317304425#s0035>.
17. E. Taylor, Dorceta. "The Rise of the Environmental Justice Paradigm: Injustice Framing and the Social Construction of Environmental Discourses." Research Gate, 2000, <https://www.researchgate.net/publication/237644402>
18. EIA Staff. "Fossil Fuels Have Made up at Least 80% of U.S. Fuel Mix since 1900". Homepage - U.S. Energy Information Administration (EIA), U.S. Energy Information Administration, 2 July 2015, <https://www.eia.gov/todayinenergy/detail.php?id=21912#:~:text=Fossil%20fuels%20have%20made%20up,U.S.%20fuel%20mix%20since%201900&text=While%20the%20energy%20history%20of,for%20more%20than%20100%20years>.
19. EIA Staff. "Frequently Asked Questions (FAQ's) - U.S. Energy Information Administration (EIA)." Frequently Asked Questions (FAQs) - U.S. Energy Information Administration (EIA), 13 May 2021, <https://www.eia.gov/tools/faqs/faq.php?id=92&t=4#:~:text=In%202021%2C%20renewable%20energy%20sources,about%2020.1%25%20of%20electricity%20generation>.
20. Energy Communities under the Clean Energy Package. REScoop.eu, REScoop, <https://uploads.strikinglycdn.com/files/48701cfd-f397-4903-9d36-1fba162223f4/Energy%20Communities%20Transposition%20Guidance.pdf>.
21. Energy Transition. IRENA.org, International Renewable Energy Agency, <https://www.irena.org/energytransition>.
22. Fact Sheet: President Biden Takes Bold Executive Action to Spur Domestic Clean Energy Manufacturing. The White House, The United States Government, 6 June 2022, <https://www.whitehouse.gov/briefing-room/statements-releases/2022/06/06/fact-sheet-president-biden-takes-bold-executive-action-to-spur-domestic-clean-energy-manufacturing/>.
23. Fishman, Ram Mukul. "Gross National Happiness — A Real Alternative or a Romantic Wish? Impressions from the Fourth International Conference on Gross National Happiness in Bhutan." *Consilience*, no. 3, 2010, pp. 179–86. JSTOR, <http://www.jstor.org/stable/26167794>. Accessed 25 Jun. 2022.
24. Gjorgievskia, Vladimir Z., et al. "Social Arrangements, Technical Designs and Impacts of Energy Communities: A Review." *Renewable Energy*, Pergamon, 21 Jan. 2021

25. Green, Nathaniel, and Matthew Kryman. "The Political Economy of China's Energy and Climate Paradox." *Energy Research & Social Science*, Elsevier, 19 Nov. 2014, <https://www.sciencedirect.com/science/article/pii/S221462961400111X>.
26. Gulagi, Ashish, et al. "Renewable Energy Transition for the Himalayan Countries Nepal and Bhutan: Pathways towards Reliable, Affordable and Sustainable Energy for All." *IEEE Xplore*, IEEE, <https://ieeexplore.ieee.org/document/9448098>.
27. Heffron, Raphael J. "Applying Energy Justice into the Energy Transition." *Renewable and Sustainable Energy Reviews*, Pergamon, 2 Dec. 2021, <https://reader.elsevier.com/reader/sd/pii/S1364032121012016?token=F08FCFD409E0EA38AF7BB1C4C6FAE6EE0E8302F2694C2ABD2908D2E51CF278B97AF467C80A6ADE4DAD8B0641C4900D36&originRegion=eu-west-1&originCreation=20220110164301>
28. IEA. "Three-Year Action Plan for Cleaner Air (Also Called the Blue Sky War) – Policies." International Energy Agency, <https://www.iea.org/policies/8508-three-year-action-plan-for-cleaner-air-also-called-the-blue-sky-war>.
29. J. Burke, Matthew, and Jennie C. Stephens. "Energy Democracy: Goals and Policy Instruments for Sociotechnical Transitions." *Energy Research & Social Science*, Elsevier, 24 Oct. 2017, <https://reader.elsevier.com/reader/sd/pii/S2214629617303031?token=32DE656A1425E483CFE7C55DA3A77084D5E92492CFAFD3425CD0A0D0E9479A8FB3D14635B1A9E16CBF1A923A5E9037FD&originRegion=eu-west-1&originCreation=20211004120043>.
30. Jebli, Mehdi Ben, and Slim Ben Youssef. "The Environmental Kuznets Curve, Economic Growth, Renewable and Non-Renewable Energy, and Trade in Tunisia." *Renewable and Sustainable Energy Reviews*, Pergamon, 21 Mar. 2015, <https://www.sciencedirect.com/science/article/pii/S1364032115001379>.
31. Jenkins, Kirsten, et al. "Energy Justice: A Conceptual Review." *Energy Research & Social Science*, Elsevier, 29 Oct. 2015, <https://www.sciencedirect.com/science/article/pii/S2214629615300669>.
32. Jennie C. Stephens (2019) *Energy Democracy: Redistributing Power to the People Through Renewable Transformation*, *Environment: Science and Policy for Sustainable Development*, 61:2, 4-13, DOI: 10.1080/00139157.2019.1564212
33. Ji, Qiang, and Dayong Zhang. "How Much Does Financial Development Contribute to Renewable Energy Growth and Upgrading of Energy Structure in China?" *Energy Policy*, Elsevier, 8 Jan. 2019, <https://www.sciencedirect.com/science/article/abs/pii/S0301421518308516>.
34. José, Débora de São, et al. "Smart Energy Community: A Systematic Review with Metanalysis." *Energy Strategy Reviews*, Elsevier, 10 July 2021, <https://reader.elsevier.com/reader/sd/pii/S2211467X2100064X?token=3A1541A7F4E14F5CCEE9DA2FDEA944E929C04CB50C27F16A5816CD7780019CF7342F804420738D64EEF476CAA39C144C&originRegion=eu-west-1&originCreation=20220110141052>.
35. K. London, Jonathan, and Raoul S. Liévanos. *Problems, Promise, Progress, and Perils: Critical Reflections on Environmental Justice Policy Implementation in California*. *UCLA Journal of Environmental Law and Policy*, 2008, https://www.researchgate.net/publication/238739863_Problems_Promise_Progress_and_Perils_Critical_Reflections_on_Environmental_Justice_Policy_Implementation_in_California.
36. K. London, Jonathan. *Environmental Justice at the Crossroads* - Researchgate.net. *Sociology Compass*, 2008, <https://www.researchgate.net/profile/Jonathan-London->

- 2/publication/227689033_Environmental_Justice_at_the_Crossroads/links/5ceeb41b299bf1fb18493a11/Environmental-Justice-at-the-Crossroads.pdf.
37. Kacper, Szulecki. Conceptualising Energy Democracy - Duo.uio.no. Rosa Luxemburg Stiftung-Brussels Office, 1 Oct. 2015, <https://www.duo.uio.no/bitstream/handle/10852/62331/Szulecki+revision+GH+revKS+CLEAN.pdf?sequence=4>.
 38. Kahia, Montassar, et al. "Renewable and Non-Renewable Energy Use - Economic Growth Nexus: The Case of MENA Net Oil Importing Countries." *Renewable and Sustainable Energy Reviews*, Pergamon, 1 Feb. 2017, <https://www.sciencedirect.com/science/article/pii/S1364032117300114>.
 39. Klačanský, Katharine. "Policy Paper: China vs. US: The Green Energy Race." EUROPEUM.org, Institute for European Policy, Aug. 2021, <https://www.europeum.org/en/articles/detail/4310/policy-paper-china-vs-us-the-green-energy-race>.
 40. Kunze, Conrad, and Sören Becker. "Energy Democracy in Europe - A Survey and Outlook." Rosa Luxemburg Stiftung, Rosa Luxemburg Stiftung-Brussels Office, 1 Oct. 2015, <https://www.rosalux.de/en/publication/id/7969/energy-democracy-in-europe/>.
 41. Leonhardt, Renata, et al. "Advancing Local Energy Transitions: A Global Review of Government Instruments Supporting Community Energy." *Energy Research & Social Science*, Elsevier, 28 Oct. 2021, <https://www.sciencedirect.com/science/article/pii/S2214629621004412>.
 42. Li, Binlin, and Nils Haneklaus. "The Role of Renewable Energy, Fossil Fuel Consumption, Urbanization and Economic Growth on CO2 Emissions in China." *Energy Reports*, Elsevier, 6 Dec. 2021, <https://www.sciencedirect.com/science/article/pii/S2352484721010052>.
 43. Li, Jianglong, and Jiashun Huang. "The Expansion of China's Solar Energy: Challenges and Policy Options." *Renewable and Sustainable Energy Reviews*, Pergamon, 23 July 2020, <https://www.sciencedirect.com/science/article/pii/S1364032120302938#sec2>.
 44. Liu, Qilin, et al. "China's Energy Revolution Strategy into 2030." *Resources, Conservation and Recycling*, Elsevier, 9 Oct. 2017, <https://reader.elsevier.com/reader/sd/pii/S0921344917303130?token=534E8BF7682CA0DDA45506A7187C61EFBA062D46F351DEEDB4AAE55724CE13110D0C73A95D103AEC1F4B73147B435382&originRegion=eu-west-1&originCreation=20220203132818>.
 45. Liu, Xiaohong, et al. "China's Renewable Energy Strategy and Industrial Adjustment Policy." *Renewable Energy*, Pergamon, 13 Feb. 2021, <https://www.sciencedirect.com/science/article/abs/pii/S0960148121002135#sec4>.
 46. Menyah, Kojo, and Yemane Wolde-Rufael. "CO2 Emissions, Nuclear Energy, Renewable Energy and Economic Growth in the US." *Energy Policy*, Elsevier, 2 Feb. 2010, <https://www.sciencedirect.com/science/article/pii/S0301421510000303>.
 47. Mohai, Paul. "Environmental Justice." *Annual Reviews*, 28 July 2009, https://www.annualreviews.org/doi/10.1146/annurev-environ-082508-094348#_i9.
 48. Montes, Jesse, and Shiva Raj Bhattarai. "Buddhist Biopower? – Variegated Governmentality in Bhutan's Gross National Happiness Agenda." *Geoforum*, Pergamon, 24 Aug. 2018, <https://www.sciencedirect.com/science/article/pii/S0016718518302422#s0005>.
 49. Overland, Indra, et al. "The Geopolitics of Renewables: New Board, New Game." *Energy Policy*, Elsevier, 10 Feb. 2020, <https://www.sciencedirect.com/science/article/pii/S0301421519306469>.

50. Overview of Energy Policies of Bhutan. Royal Government of Bhutan, <https://eneken.ieej.or.jp/data/2598.pdf>.
51. Palle, Angélique. "Bringing Geopolitics to Energy Transition Research." *Energy Research & Social Science*, Elsevier, 17 Oct. 2021, <https://www.sciencedirect.com/science/article/pii/S2214629621003261>.
52. Pellegrini-Masini, Giuseppe, et al. "Energy Justice Revisited: A Critical Review on the Philosophical and Political Origins of Equality." *Energy Research & Social Science*, Elsevier, 25 Sept. 2019, <https://www.sciencedirect.com/science/article/pii/S2214629618303906#sec0007>.
53. Pesch, Udo. "Elusive Publics in Energy Projects: The Politics of Localness and Energy Democracy." *Energy Research & Social Science*, Elsevier, 22 June 2019, <https://reader.elsevier.com/reader/sd/pii/S2214629618311149?token=CD8CFD6DA24E1AE9C996CA3B2121D2CAA233D518F2389AFE7F4DD415653C66A42E8AC7663C694CB97B2D9D7CF5A50EA1&originRegion=eu-west-1&originCreation=20220109130042>.
54. Pomeroy, Elizabeth, et al. "China's Energy Security and Its Grand Strategy - Stanleycenter.org." <https://stanleycenter.org>, The Stanley Foundation, <https://stanleycenter.org/publications/pab/pab06chinasenergy.pdf>.
55. Ramos, Alberto Cortes et al. *Energy Democracy Workshop Report*. Transnational Institute, 2016, https://www.tni.org/files/publication-downloads/energy_democracy_workshop_report_for_web-2.pdf.
56. Rommel, Jens, et al. "Community Renewable Energy at a Crossroads: A Think Piece on Degrowth, Technology, and the Democratization of the German Energy System." *Journal of Cleaner Production*, Elsevier, 19 Nov. 2016, <https://www.sciencedirect.com/science/article/pii/S0959652616319667#kwrds0010>.
57. Shalanda H. Baker. *Energy.gov*, US Department of Energy, <https://www.energy.gov/diversity/person/shalanda-h-baker>.
58. Shuai, Jing, et al. "Renewable Energy Product Competitiveness: Evidence from the United States, China and India." *Energy*, Pergamon, 9 Mar. 2022, <https://www.sciencedirect.com/science/article/pii/S0360544222005175#sec5>.
59. Sovacool, Benjamin K., and Frank W. Geels. "Further Reflections on the Temporality of Energy Transitions: A Response to Critics." *Energy Research & Social Science*, Elsevier, 25 Oct. 2016, <https://www.sciencedirect.com/science/article/pii/S2214629616301967>.
60. Sovacool, Benjamin K., et al. "Differences in Carbon Emissions Reduction between Countries Pursuing Renewable Electricity versus Nuclear Power." *Nature News*, Nature Publishing Group, 5 Oct. 2020, <https://www.nature.com/articles/s41560-020-00696-3>.
61. Sovacool, Benjamin K., et al. "Resolving Society's Energy Trilemma through the Energy Justice Metric." *Energy Policy*, Elsevier, 19 Sept. 2015, <https://www.sciencedirect.com/science/article/pii/S030142151530077X#s0010>.
62. Stephens, Jennie C. "Energy Democracy: Redistributing Power to the People Through Renewable Transformation." *Environment: Science and Policy for Sustainable Development*, Taylor and Francis Group, 13 Feb. 2019, <https://www.tandfonline.com/doi/epub/10.1080/00139157.2019.1564212?needAccess=true>.
63. Sweeny, Sean. *Resist Reclaim Restructure - Rosa-Lux*. Rosa Luxemburg Stiftung —New York Office, https://www.rosalux.de/fileadmin/rls_uploads/pdfs/engl/resistreclaimrestructure_en_2013.pdf.

64. Sweidan, Osama D. "State Capitalism and Energy Democracy." *Geoforum*, Pergamon, 27 Apr. 2021, <https://www.sciencedirect.com/science/article/pii/S001671852100107X#b0035>.
65. Szulecki, Kacper, and Indra Overland. "Energy Democracy as a Process, an Outcome and a Goal: A Conceptual Review." *Energy Research & Social Science*, Elsevier, 8 Sept. 2020, <https://www.sciencedirect.com/science/article/pii/S2214629620303431>.
66. The Green New Deal. Bernie Sanders Official Website, Friends of Bernie Sanders, <https://berniesanders.com/issues/green-new-deal/>.
67. Thombs, Ryan P. "When Democracy Meets Energy Transitions: A Typology of Social Power and Energy System Scale." *Energy Research & Social Science*, Elsevier, 4 Mar. 2019, <https://www.sciencedirect.com/science/article/pii/S2214629618307692>.
68. Uddin, Sk Noim, et al. "Energy, Environment and Development in Bhutan." *Renewable and Sustainable Energy Reviews*, Pergamon, 12 May 2006, <https://www.sciencedirect.com/science/article/pii/S1364032106000529>.
69. Veelen, Bregje Van, and Dan van der Horst. "What Is Energy Democracy? Connecting Social Science Energy Research and Political Theory." *Energy Research & Social Science*, Elsevier, 20 June 2018, <https://reader.elsevier.com/reader/sd/pii/S2214629618306261?token=65BA11E1E32A324920B00CE7DFB8E350BC5BCBF357C96C0A455713418744AD82776FD62583EEA42AD7354F300A4E9657&originRegion=eu-west-1&originCreation=20220108125512>.
70. Veelen, Bregje Van. "Negotiating Energy Democracy in Practice: Governance Processes in Community Energy Projects." Taylor & Francis, *Environmental Politics*, <https://www.tandfonline.com/doi/full/10.1080/09644016.2018.1427824?scroll=top&nfeedAccess=true>.
71. Wahlund, Madeleine, and Jenny Palm. "The Role of Energy Democracy and Energy Citizenship for Participatory Energy Transitions: A Comprehensive Review." *Energy Research & Social Science*, Elsevier, 4 Jan. 2022, <https://reader.elsevier.com/reader/sd/pii/S2214629621005697?token=2E20A26EE0CA1B5FBB186A1B7A096416F62164266DAFEFE7D9DB715DB88D76076E594FA5C0EA90E9F47D5DB042CBAF31&originRegion=eu-west-1&originCreation=20220107131816>.
72. Wang, Juan, et al. "The Relationship of Renewable Energy Consumption to Financial Development and Economic Growth in China." *Renewable Energy*, Pergamon, 10 Feb. 2021, <https://www.sciencedirect.com/science/article/pii/S0960148121002068>.
73. Xie, Jueren. "Finite Element Analysis of Casing and Casing Connections for Shale Gas ..." Researchgate.net, SIMULIA Community Conference, https://www.researchgate.net/publication/307957311_Finite_Element_Analysis_of_Casing_and_Casing_Connections_for_Shale_Gas_Wells.
74. Xu, Shengqing. "The Paradox of the Energy Revolution in China: A Socio-Technical Transition Perspective." *Renewable and Sustainable Energy Reviews*, Pergamon, 21 Oct. 2020, <https://www.sciencedirect.com/science/article/pii/S1364032120307553>.
75. Yangka, Dorji, et al. "Sustainability in an Emerging Nation: The Bhutan Case Study." MDPI, Multidisciplinary Digital Publishing Institute, 18 May 2018, <https://www.mdpi.com/2071-1050/10/5/1622/htm>.
76. Young, Iris Marion, et al. *Iris Marion Young: Gender, Justice, and the Politics of Difference*. Routledge, 2022.

77. Yu, Shiwei, et al. "Does the Development of Renewable Energy Promote Carbon Reduction? Evidence from Chinese Provinces." *Journal of Environmental Management*, Academic Press, 6 May 2020, <https://www.sciencedirect.com/science/article/pii/S0301479720305661>.
78. Yuan, Jiahai. "The Future of Coal in China." *Resources, Conservation and Recycling*, Elsevier, 21 Dec. 2016, <https://www.sciencedirect.com/science/article/pii/S0921344916303731?via%3Dihub#sec0005>.
79. Zhang, Shijie, et al. "China in Global Wind Power Development: Role, Status and Impact." *Renewable and Sustainable Energy Reviews*, Pergamon, 28 Apr. 2020, <https://www.sciencedirect.com/science/article/pii/S136403212030174X>.
80. Zhao, Xin, et al. "Challenges toward Carbon Neutrality in China: Strategies and Countermeasures." *Resources, Conservation and Recycling*, Elsevier, 7 Oct. 2021, https://www.sciencedirect.com/science/article/abs/pii/S0921344921005681?dgcid=raven_sd_recommender_email.
81. Zheng, Huanyu, et al. "The Evolution of Renewable Energy and Its Impact on Carbon Reduction in China." *Energy*, Pergamon, 30 July 2021, <https://reader.elsevier.com/reader/sd/pii/S0360544221018879?token=36251262EDF2E9A04F132615FEDBF913C9F20A0BEDD6575809F76E267DEBBD1FCE6D562CD155322FCE783E7F746E2AB1&originRegion=eu-west-1&originCreation=20220204134318>.
82. Zhu, Jia, et al. "Multi-Pollutant Air Pollution and Associated Health Risks in China from 2014 to 2020." *Atmospheric Environment*, Pergamon, 5 Nov. 2021, <https://www.sciencedirect.com/science/article/pii/S1352231021006518>.
83. ZOU, Caineng, et al. "On the Connotation, Challenge and Significance of China's 'Energy Independence' Strategy." *Petroleum Exploration and Development*, Elsevier, 17 Apr. 2020, <https://www.sciencedirect.com/science/article/pii/S1876380420600623>.