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# *Research on the Status Quo Bias in Energy Consumption: Evidence from China*

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***Abstract:*** Nowadays environmental degradation increasingly attracts public attention. As there appear to be increasing concerns regarding the connection between environmental problems and energy utilization, this paper intends to examine the influence of status quo bias on energy-related choices, where people are inclined to consume traditional energy instead of renewable energy. Since China is the country that emits the largest percentage of carbon dioxide, the priority of this research is placed on this country. The presence of status quo bias is revealed statistically by two graphs, depicting the overall energy consumption trend over recent years and the specific energy use composition in 2021 respectively. The influential factors are illustrated as the policy framework, population age and costs for materials. This paper proposes the measures of policy framework reformation, pricing, taxation and subsidization to address the status quo bias, and the potential issues with these measures are indicated. The expectation for further study is discussed at the end of this paper, such as the insufficiency of research on how the degree of status quo bias varies geographically.

***Keywords:*** status quo bias, renewable energy, energy consumption, energy decision

## 1. Introduction

With a long history of being applied in daily life, energy plays a central role in human development. World energy use has risen at an increasing pace since the Industrial Revolution. This period saw a rapid and tremendous increase in carbon dioxide emissions as well, the majority of which were driven by fossil fuel exploitation, which tends to adversely impact the environment by accelerating global warming. This coincidence makes it necessary to consider renewable energy as an alternative source to substitute traditional energy. Despite the efforts invested by the Chinese government in achieving the target of carbon neutrality by 2060, China keeps experiencing a relatively high usage of fossil fuel consumption in the global ranking. Although China views having a leading position in the world renewable energy adoption as a positive sign, the governmental departments should keep refining the policy framework in an attempt to better meet the energy-related requirements for environmental protection. China and other countries have expressed differing perspectives on the energy transition. For instance, China regards the application of renewable energy sources as not only an approach to mitigating carbon emissions but also a pathway for energy security, in contrast with the German view that renewable energy exploration is essential for electricity generation [1]. This distinction potentially results in opposite treatments concerning nuclear energy between these two countries. Alternatively, in terms of energy intensity, which is a measure of energy inefficiency in an economy,

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the figures in China dropped continuously for years, while an overall upward tendency was witnessed in Japan as a consequence of the policy direction to minimize energy dependence [2]. This paper aims to investigate the reasons behind the paradox between renewable energy adoption and fossil fuel utilization in China, as well as how to overcome this energy dilemma and how the regulatory framework can be improved. In addition, the role played by status quo bias in affecting public decisions linked with energy consumption will be analyzed, and the methods to alleviate the implications of this cognitive bias will be proposed as well.

## 2. Literature Review — How Does Status Quo Bias Influence Energy Decision

Status quo bias refers to the propensity to maintain the original situation and resist making changes. Previous research has confirmed the existence of status quo bias in decision-making by the general public. Maltz and Romagnoli ran an experiment containing four treatments satisfying all scenarios between two options which could be risky or ambiguous to test the preferences of participants on gambles. The experiment presented that the effect of status quo bias becomes exceptionally noticeable when one of the previous and new options is risky and the other one is uncertain [3]. Volpp and Loewenstein outlined several mechanisms for how the lack of incentives is formed, with status quo bias being one. Status quo bias was argued to likely result in an unbalanced evaluation of potential losses from switching between different options, thereby reflecting the behavioral resistance to a newly emerging choice [4]. Godefroid et al. assessed four main ways to measure the magnitude of status quo bias by collecting data from various research fields, one of which was to apply the construct from the facet of cognitive misperception. Then the researchers suggested potential remedies to compensate for the repercussions of status quo bias in making decisions, where the practices of offering social feedback and changing social norms were included [5].

From the aspect of energy consumption, via collecting data on GDP by province, urban demographic statistics, exports, imports and the degree of urbanization respectively from the provinces sampled as three groups and modelling the carbon dioxide emissions accompanying energy use, Yulong Chen found these elements to be influential factors for the consumer acceptance of renewable energy adoption in the country. The author revealed the usage of renewable energy to be positively associated with economic growth, albeit the strength of the association appears to vary regionally [6]. This indicates that the government should continue to advance policies that stimulate economic growth and aid in distributing income levels evenly across the country. Regarding the finding that imports of fossil fuels per capita and renewable energy consumed were negatively correlated, policymakers ought to discourage importation by taxing them more effectively. By examining the data gathered through surveying a large family from three European nations, Blasch and Daminato discovered status quo bias to be a factor that likely affects energy consumption efficiency. It was identified that individuals influenced by status quo bias were 5.7% more likely to use aged appliances for an unusually long time at an intense frequency compared with those without such a bias [7]. This necessitates the need to design policies motivating biased consumers to replace the old appliances with new ones more actively for facilitating energy efficiency, where providing financial rewards is one of the measures.

## 3. Analyses of the Energy Situation in China

### 3.1. The Reality of the Energy

As exhibited in Figure 1, the primary energy consumption in China has seen a continuous rise at an exponential rate from fewer than 2,500 terawatt-hours in 1965 to greater than 40,000 terawatt-hours in 2021. Coal and oil continued accounting for the highest shares being more than 70% of the overall energy sources, and coal remained the most widely used one throughout the period. This phenomenon

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is particularly prominent since 2003, which perfectly corresponds to the start of the Fourth Industrialization is marked by the process of completing such a transition and further introducing diverse digital technologies, which is underlyingly fueled by the reform and opening-up policy in China since 1978. The transformation of manufacturing technologies has contributed to fundamental improvements in productive efficiency and therefore economic growth, thus enhancing general living standards [8]. This can further stimulate economic development, where higher consumer demands due to income rises are associated with output increases which require more energy supply, whereby a cycle is formed. Despite the economic benefits brought about by rising energy usage, given that the majority of energy resources applied originated from non-renewable ones, an urgent priority ought to be placed on how to minimize the non-renewable energy use and promote the adoption of renewable energy, where the effects of status quo bias in energy-related decision-making should be analyzed and coped with.

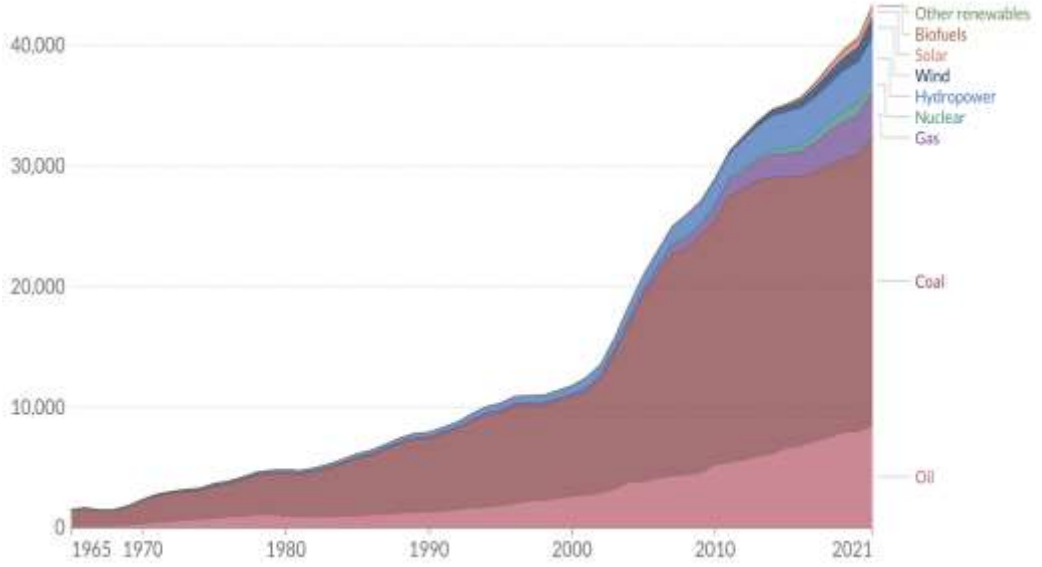


Figure 1: Framework of the experiment. Data Source: BP Statistical Review of World Energy.

## 3.2. The Energy Development Path

As a major carbon emitter in the world, China has been issuing a series of periodic five-year national plans since 1953, where the strategic policies for maintaining environmental sustainability and supporting renewable energy exploration are entailed in these plans since the 1990s, and action is taken by relevant agencies to ensure smooth implementation of the related policies. Admittedly, China has made admirable progress on the path of renewable energy application. For instance, in the field of wind power, China was accountable for 35.73% of the global wind power installed capacity cumulatively in 2018, and continued to constitute over 33.33% of the global figure for four consecutive years [9]. However, coal continued to occupy a formidably high share of 55% in the energy use distribution in 2021 in China, followed by the figure of 19% from petroleum.

As shown in Figure 2, which is suggestive of the continued status quo bias on non-renewable energy resources and consequent finiteness of the progress made by China. There have been persistent problems with the energy policy framework in China, which inevitably give rise to inhibitors on the evolution of renewable energy resources in the country. When compared with Germany, a country that commonly witnesses relatively low percentages of carbon emissions, inflexibility is rooted in the structure of energy-related policies in China. To illustrate, Germany initiated the legislative framework named the Renewable Energy Act in 2000, which is equivalent to the five-year plan in

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China as regards the importance in steering the direction of renewable energy usage. This act has encountered several revisions since the enactment, with the latest one being launched in 2023. Each revision would bring about transformative movements pertaining to how to promote renewable energy adoption due to the combination of perspectives from the public role and the private party being the community in this context, thus representing adequate flexibility in the renewable policy-making process. The resilience induced by the functioning of community forces can be instanced by a grassroots movement facilitating the advent of Evergreened, which is a German energy revolution conducing to the rejection of nuclear power. In contrast, the overwhelming authority of the central government and the isolation of the local administration generate a lack of coordination for the regulations and policies launched, which is normally associated with relative shortsightedness regarding how to optimize the energy policies in China. This can result in exorbitant expenditures for the central government to resolve issues in policy planning as well, partially due to the time required for transmitting the information. This can be exemplified by the fact that the interaction between energy, environment, and economy is frequently overlooked in five-year plans, which implies that the policies pertaining to these three components may not be commensurate with each other. This situation manifests the presence of status quo bias in the decision-making concerning energy-related policies, where it can be comparatively slow for the central government to make changes to the policy design. Hence, it is recommended for China to slightly coordinate the tasks between the central and residential governments, and monitor the efficiency of the local agencies more regularly and stringently, which tends to enhance the flexibility in the policy structure for energy decisions.

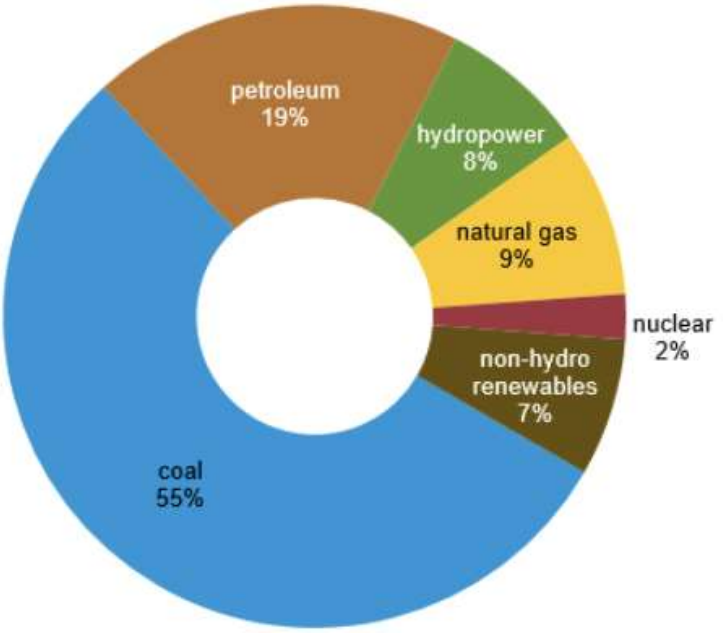


Figure 2: Aggregate primary energy usage in China by fuel type in 2021. Data Source: BP Statistical Review of World Energy 2022.

### 3.3. The Policies to Resolve the Status Quo Bias on Non-renewable Energy

The main non-renewable energy resources in China are coal and oil. The research in this section mainly focuses on the coal industry in China as a result of its dominance in the energy market. Figure 3 illustrates how the indices of coal stock values have changed recently in China, which is representative of the market price variations of coal. It is presented that the values of coal peaked twice between 2008 and 2010, which saw constant fluctuations surrounding 6 after that period until

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the present, displaying an overall downward trend from the maximum value of more than 20 before 2010. to the minimum value of slightly lower than 4. Therefore, the ways to optimize the pricing system and taxation for coal usage are likely to disincentivize coal consumption with effectiveness.

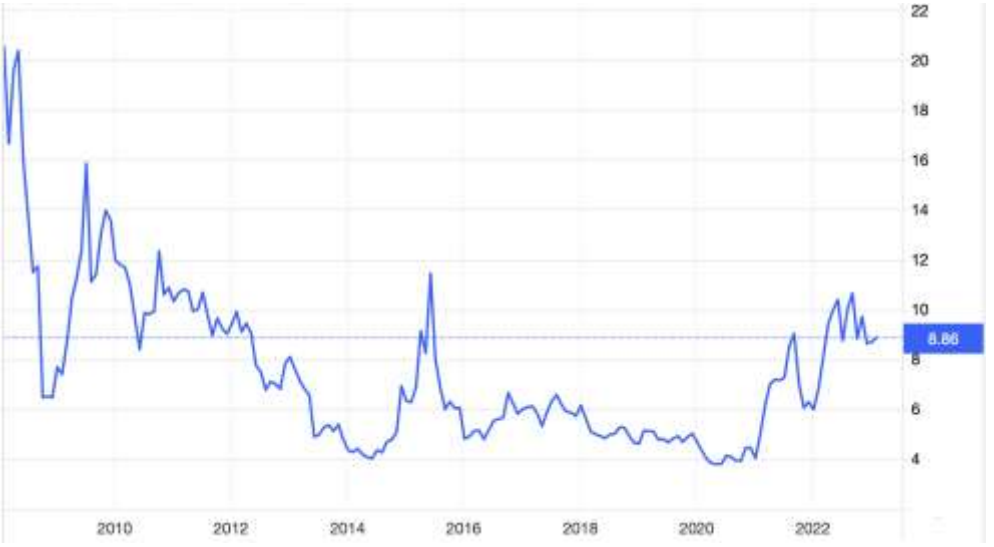


Figure 3: Coal stock indices in China. Data Source: Trading Economics.

### 3.3.1. Pricing

It has been demonstrated that production is one of the most impactful elements that determine the coal price in China [10]. There has been excess demand for coal over supply, partially owing to the comparatively low price of coal, which is linked with market failure, where a misallocation of resources exists. Noting that the disproportionately low prices can affect the use of coal substantially, a transformation of the pricing mechanism for coal is called for. The role played by the government still has great effects on the pricing of coal, which is disposed to involve policy distortions. For example, the current pricing mechanism is potentially more reflective of the stabilization purpose than the actual market need, which in reverse cannot provide useful signals on the market price [11]. Moreover, not only should there be a minimum price to deter oil trading, but also more strict regulations on unseen market transactions, whereby the disincentive impact will be reinforced.

### 3.3.2. Taxation

Taxation is another area that merits attention in an effort to limit the number of transactions for coal, since costs for materials form a contributor to status quo bias on conventional energy products. Less than 10% of coal consumption is thought to be imported into China, with the rest coming from within the nation. Thus, the taxation policy for coal should be concentrated on domestic taxes, with tariffs taking an accordingly low proportion. A reformation of the taxation for coal has occurred, where the price-oriented method has replaced the previous quantity-oriented one, signaling that the amount of taxes levied on coal will be determined by the price of coal rather than the amount used. The tax rate ranges from 2% to 10% and is implemented differently in each province. Although a higher rate can be expected to have more prominent effects on the discouragement of the coal trade, concerns arise over whether higher taxes will lead to more pressure on economically disadvantaged residents. The tax system modification is found to be factually regressive and has a more visible impact on low-income households, indicating that the tax rate should be determined in accordance with the financial circumstances of local families [12].

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### 3.3.3. Subsidization

Subsidization on the production and consumption of renewable energy resources constitutes another method to promote sustainable use of energy. From the aspect of production, research conducted by Liu and Zeng has shown several types of risks for financing renewable resources, which are policy, technical and market risks, which function as catalysts for status quo bias on energy choices. The authors introduced a model of estimating the total risks via aggregating the three categories of risks that are multiplied by weights respectively. The policy risk seems to be the predominant risk initially, the position of which is superseded by market risk in the wake of the proliferation of technology firms as a consequence of prospective changes in the market size and competitiveness [13]. Accordingly, the provision of higher subsidies will help firms to cover the risks and incentivize them to invest. Alternatively, to target the consumers, in consideration of the worries about the instability of renewable energy, governmental experts can give more public lectures on the benefits of renewable energy products for clarification [14]. Furthermore, in considering the effects of age on the acceptance of renewable energy resources, where population ageing is negatively correlated with the acceptance, it is a feasible option for the government to reward the consumers embracing renewable energy services financially with differential degrees on age [15].

## 4. Conclusion and Policy Guidance

This paper exhibits the role of status quo bias in public energy-related decisions in China via outlining the diagram for energy consumption by fuel category with a time horizon. Policy framework, population age, and material costs are suggested as factors affecting the general preference for energy resources. In light of the policy inflexibility, the Chinese government should reform the legislative structure by reconciling the roles between the central and individual governments and developing a system to monitor the local administration more closely. Considering the environmental consequences of conventional energy usage, particularly the global warming arising from recent rapid increases in carbon emissions, it is obligatory for the Chinese government to restrict the public incentive to overly use traditional energy products. Given the costs of materials and energy manufacturing as influential factors, taxation ought to be imposed as domestic taxes and tariffs, where domestic ones are analyzed due to high concentration. Notwithstanding, the taxation should be lenient to the citizens with financial disadvantages due to the regressive nature. Additionally, the offering of subsidies is another policy option, which is investigated from two perspectives being producer and consumer ones. With respect to the producer perspective, risks are considered to affect the investment in renewable energy exploration significantly, with policy risk being the previous main type of risk and policy risk substituting the position afterwards. This is indicative of the need for the government to fiscally support the firms researching renewable energy uses for incentivization. With reference to the consumer perspective, in terms of the concerns for renewable energy instability, it is suggested for the government to give more public lectures to clarify the positive characteristics of renewable energy resources. Given the tendency that the ageing population is likely to be more unwilling to accept renewable energy products, when subsidies are provided for customers, the aged should be offered more. There is still progress to be made on the research relating to status quo bias in the energy market in China. For instance, geographical impacts on the extent of the public status quo bias on energy decisions require investigation, as there may be differentiation among the willingness to accept renewable energy uses in various regions. This will be entailed in further research.

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