

**On the Distribution of Political and Electrical Power:
Lessons to be Learned from China, Lessons to be Applied to Charlottesville**


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James Patterson
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On my honor as a University Student, I have neither given nor received
unauthorized aid on this assignment as defined by the Honor Guidelines
for Thesis-Related Assignments

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Introduction (Fable of Tomorrow)

It's a humid day in mid-August. The American coastal neighborhood's residents do their best to stay dry in the wake of a recent tropical storm. A handful of banded-together neighbors come back from a trip down to a Convoy of Hope truck, bringing fresh water, hygiene products, and some food with them. A few generators are up and running, and the neighborhood manages to scrape by, day by day, learning to live with what they are given or can find from newly-abandoned houses. In September, the Convoy of Hope trucks have left, the generators are low on gas, and the country's become fixated on wildfires somewhere else, or the latest verbal misstep of a national figure. The neighbors still band together, but without power and a strong support system, the going continues to get rougher. In October, the corporations have already gained all the social credit they need from helping these residents, and many half-committed sources of support begin to rescind their resources. The neighbors have to work harder, play dirtier, and cut even more corners to stay afloat. Sometime next year, the lights will finally come on again in the neighborhood, but the place and its people will never be the same after the long months of treacherous life.

Now it's a hazy day in mid-September. The Chinese coastal neighborhood's residents report in to the local relief center, and are shuttled out to another, drier neighborhood after the latest series of heavy storms. During the first month, they're able to see their family, they've kept in touch with law enforcement, and they maintain a relatively high standard of living, thanks to centralized and mandated governmental support. Then, as November approaches, their amount of support continues to persist, not motivated by social credit or fixated on the most pressing sources of disaster refugees. As the year ends, they return to their neighborhood, finding it empty and somewhat untidy, but restored and well-powered just a month or two after a devastating storm. While certainly shaken by the unfortunate circumstances, the neighbors are able to return to a status quo in a relatively timely manner, picking up where they had left off months earlier and restoring their neighborhood to its working status.

Neither of these scenarios are completely founded in historical fact, but both of these snapshots of culture may quite realistically translate into the forthcoming future. In fact, disaster relief in Puerto Rico and Louisiana quite closely mirror the unfortunate situation of American life during natural disasters. It's important to consider the political and cultural differences between these two great countries, and to use this knowledge to consider the best means by which to configure each country's infrastructure.

Introduction (Research Question)

While it's evident that the United States and China greatly differ in the means by which they distribute resources among and toward their citizens, a wide variety of factors may influence the causes of such a difference. This document seeks to qualify a relevant subset of factors which influence the differing perspectives of American and Chinese culture, as seen through the window of energy provision along a grid. On a higher level, it is feasible to explain the differences in distribution of social power through a finer understanding of the differences in distribution of electrical power between countries. Some factors which might contribute to this cultural difference include the difference between capitalism and socialism, meritocracy and pragmatism, Protestantism and Confucianism, personal responsibility and civil liberty, and individual finance and environmental consciousness. However, it's important to highlight a

caveat to country-wide cultural difference analysis. Due to circumstances surrounding research provision, most data upon which this paper is built comes from only one municipality per country, and even within those municipalities, the collected data may not holistically reflect the consensus of either community. It's for this reason that this thesis seeks to find a relevant subset of causes for differing cultures and not the complete list of differences between two societies.

Literature Review

In preparing for this project, a variety of resources were collected and consulted, especially in regards to business practice and the ability of individuals to impact their energy usage. As regulations and codes currently stand, many individuals lack the power to change the way they consume energy, or to investigate cleaner, more efficient options. This power tends to fall to landlords or other leasing agencies (2). As a result, many of Charlottesville's landowners may own property in historically at-risk neighborhoods, but they may never actually experience the outages which can plague these areas without living there themselves.

Large companies tend to dominate the general American discussion surrounding Smart Cities, and by writing the "rulebook" on how a Smart City should function, they can strategically ignore common interests of most citizens (3). This means that big companies like Dominion Energy in Charlottesville, though proclaiming to enact "Smart Energy" policies (7), can move the goalposts on the definition of Smart Energy in order to avoid making meaningful improvements to the situation of the disenfranchised. In the short term, working harder to build reliable grid systems and implementing high efficiency energy practices would be a costly venture, but in fact these practices have been shown to decrease the overall load on the grid as a whole, and to increase the economy in affected areas by as much as 50 percent (1). With such a profitable upside, it would be much easier to work with and advertise to a big company such as Dominion, if and when such a situation may occur.

In the last decade, China, the country most responsible for greenhouse gas emissions and the country most filled with million-resident cities, has marked energy efficiency and cleanliness as a more pressing issue. In its dense, highly packed cities, the many skyscraping buildings contribute more CO₂ towards air pollution than vehicles, so making buildings and infrastructure more efficient directly improves the air quality. From 2006 to 2010, China implemented a Five-Year Plan which reduced its emissions rate by 400 million tons, and this stride for cleaner practice also improved the energy grid's efficiency by 19.1 percent. (6)

STS Framework

The issue of energy provision and consumption in the United States becomes rather complicated after first glance, and so to better understand how stakeholders find issues with the current system and how their designs handle those issues, I can investigate this issue using the framework of Social Construction of Technology, or SCOT. Using this framework, I can diagnose the extent to which the existing grid-consumer paradigm has disenfranchised American citizens, and how this social group can leverage their community, an increase in technological

capacity, and the knowledge gained worldwide to create a better, more consistent infrastructure. Specifically, the project seeks to analyze the potential for a particular techno-social innovation (independent hybrid energy sources) to impact the current energy landscape in the United States as both a platform for positive environmental impact and as a means by which to compel market-dominant companies like Dominion Energy to provide for disenfranchised communities.

Method

The research question at hand is one comparing the electrical infrastructures of two locations with vastly differing cultures and (at times) ideologically opposed politics. As a result, obtaining data to help understand and answer this question in solely one geographical location would be improper. Therefore, the method of obtaining data will consist (mainly) of two sections: the domestic sector (Charlottesville, Virginia) and the global sector (China).

In order to adequately gain a healthy amount of knowledge surrounding the electric infrastructure of Charlottesville, one must take into account a variety of influences, and one must consider the widest margins of residents as is reasonable. To do this, I plan to embark on three primary avenues of data collection locally. First, I hope to attend and observe town hall meetings in Charlottesville, gaining an idea of to what extent citizens prioritize their concerns about the electric grid. Second, I hope to survey groups of concerned residents of Charlottesville who would not always be considered citizens or residents. This mainly includes students at the University of Virginia, whose tenure in Charlottesville is often short but also often confined to low-rate, low-utility housing. Finally, I hope to conduct an interview with one or two potential experts on the subject of the local Charlottesville grid, either speaking to a member of the local city council, to an executive or manager within Dominion Energy, or to a professor at the University whose research is adjacent to grid infrastructures. In the event that such an interview is unlikely, interviewing a different professor whose expertise illuminates the political history of Charlottesville would also satisfy the conditions of this research, as the question specifically includes room for discussion about political topics.

I hope to use similar, though not exactly equal, methods to understand the electric infrastructure of Chinese cities and how that relates to their politics. There are two major avenues through which I hope to understand the Chinese system. First, I hope to interview and connect with real engineers in China, primarily through the pre-existing system within UVA's STS department. With these interviews, I can not only understand to what extent the average Chinese citizen cares for their utility fees, but I can also understand how Chinese people understand each other, and to what extent they feel their society is as divided on racial or socioeconomic lines as society is in the United States. Second, I hope to consult artifacts, especially literature, surrounding the development and proliferation of the many "supercities" which are being rapidly developed in many areas of China. With this information, I hope to understand to what extent the designers of these cities consider the lives and differences of the cities' citizens. Additionally with this type of research, it should be more natural to understand to what extent these large cities' grids provide for their citizens, holistically and evenly.

Data Analysis

Sources of data for this thesis come primarily from a series of interviews conducted by a group of students (including myself) at UVA during the fall semester of 2019. During this series

of interviews, a host of valid candidates for this thesis, from Chinese citizens to energy-conscious American professors, were interviewed regarding their energy consumption habits and to what extent they would approve of government-enforced energy use regulations. Additionally, an additional American perspective is gained from anecdotal experience in the geographical area surrounding UVA, as off-grounds residents experience the deficiencies of the current energy infrastructure on a regular basis, especially during times of inclement weather. Finally, this thesis references information from literary sources in China which cover similar energy-conscious topics.

The data below is organized to reflect portions of the above-defined research question. Since there are many relevant factors which can shape cultural perception of energy distribution, the collected information is first partitioned across country lines, and then split between personal interviews and relevant city-wide documentation, such as government records or news articles.

During the fall of 2019, a series of interviews were conducted with UVA professor Harry Powell, Ph.D, concerning the ability of Charlottesville to adapt to ‘smart’ energy technology and how this interacts with the American culture which pervades many towns like Charlottesville. IN reference to whether or not Charlottesville is an ‘average’ American town, Professor Powell indicated that Charlottesville matches many other small towns, and, but for the influence of the University of Virginia, Charlottesville would become identical to its neighboring small towns, such as Culpepper, Virginia. Powell suggested that Charlottesville, like many other small towns in the United States, is ‘behind’ in terms of technology, and would require the ‘whole community’ to be on board for any sort of meaningful ‘smart energy’ policy to make a difference for the town. Powell also emphasized the importance of economic policy as the main motivator for other activity: “If anything is gonna happen in the other categories [for instance, Smart City Planning], there has to be available capital to pay for these projects.” Additionally, many Charlottesville residents and University of Virginia students experience firsthand the limits of the current energy grid. For instance, a neighborhood-wide ‘brown out’ occurred during a particularly exciting home football game for the residents near UVA’s Scott Stadium when the Cavaliers hosted the Notre Dame Fighting Irish. Residents of this centrally located neighborhood often experience power outages during heavy rainfall or inclement weather. This appears to occur not only for apartment residents, but also for small businesses in the area, and indicates a consistently exploitable weakness in the local energy grid for this urban location.

In addition to the expert’s perspective on the ability of Charlottesville to adapt to smart energy grid technology, many residents of the town itself have various perspectives on the ability of the grid to provide useful and consistent service. Due to unforeseen pandemic-related circumstances, physical attendance of a Town Hall meeting in Charlottesville became infeasible. However, throughout the first four months of Regular meeting minutes, only four mentions of energy emerge, and all but one of these mentions are concerned only with clean energy policy, and the 2015 Paris Climate Change Accords. Once, a speaker indicated that energy costs were increasing and encroaching on the financial freedom of disenfranchised people. (8)

When focusing instead on the situation in China, a somewhat more nebulous picture appears. While small blackouts rarely pique the interest of even local newspapers, they interest the news sources which reach across national borders far less. As a result, there exists a sampling difficulty when assessing the frequency of blackouts in a completely separate country. With that in mind, data concerning the energy situation in China may still be collected, and interpreted based on the attitude such a country takes towards its energy provision. For instance, seeing which organizations support large energy-related projects and observing the portion of the

population best served by these projects may indicate the status of energy provision in those areas.

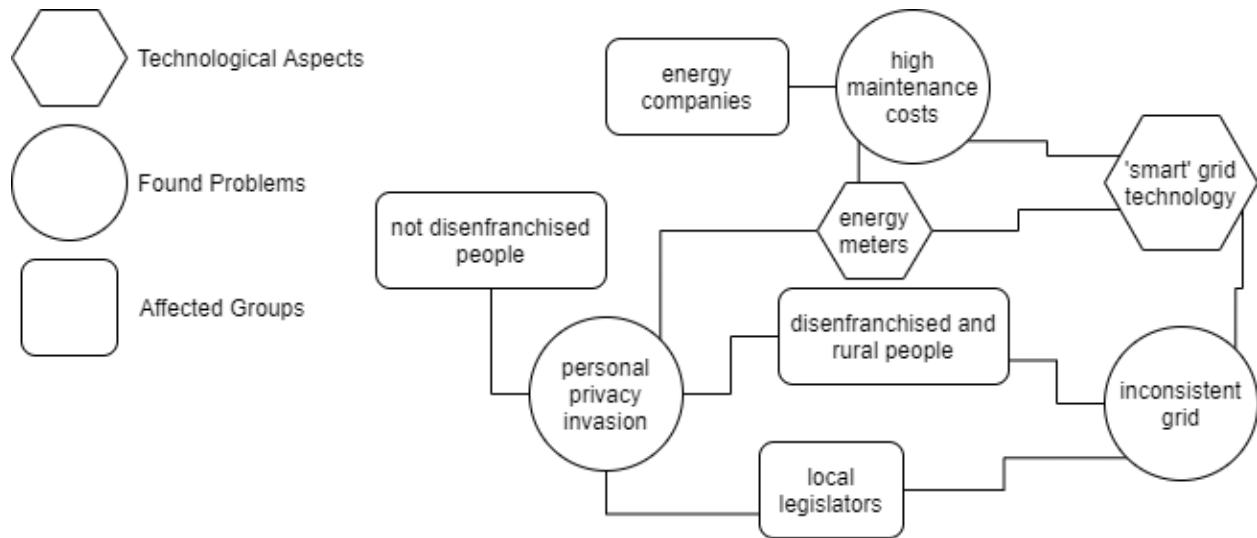
In the fall of 2019, a series of interviews were conducted with students at Zhejiang University in China. During these interviews, the students were asked about the true meaning of the Smart City, and consequently, how a Smart City could best oversee the use of energy infrastructure. One student remarked that a “combination of small, regular changes would [help] people make a meaningful change,” indicating that good practice comes from people as well as from the government itself. Another student noted that “Chinese traditional culture teaches [them] to be diligent and thrifty.” Finally, a third student indicated that changes to transportation habits and the systems therein would help to reduce the types of energy consumed, as well as helping to streamline the ways in which energy is distributed to people.

Inspecting the media within China and the imperatives put forward by municipal authorities can help show another perspective of their energy situation. In Hangzhou, innovation has helped create a surplus of clean energy, which has not only been apportioned to replace other “dirtier” energy sources, but has also been used to augment and improve the energy grid within the city (9). Hangzhou’s geographical location helps it utilize both solar and marine energy, harnessing tidal patterns to provide clean and copious energy to its residents. With this influx of energy and a heap of innovation, Hangzhou can use its empowered grid to move clean energy practice to its citizens, using a smart grid and an influx of electric cars to provide clean options to Hangzhou residents. In this way, the opinion of the interviewees of personal practice can be enabled and empowered by governmental actions designed to make such a personal practice much more affordable and convenient.

Discussion

From the data presented above, two sets of conclusions can be drawn: one regarding the general opinion on energy conservation in the United States and one regarding the energy opinion of Chinese people. In general, residents and experts within the United States frame the issue of energy conservation as a compromise between energy use and personal freedom. For instance, using a smart meter might be beneficial for a company trying to regulate city-wide energy use, but it requires taking each individual’s personal information regarding when, where, and how they use energy. In the United States, there’s a reasonable case to be made for concern regarding the ability of a government to keep a corporate entity from misusing the information gained from such a wide base of users. In the United States, other metrics like property values have been used to disenfranchise people in the past, and citizens may be wary to invite another metric to influence where power is provided, in both the literal and the political sense. And, given the understood propensity towards ineptitude prescribed to local government in the United States, citizens may feel that no government is equipped to reasonably handle a large, efficient company with a monopoly on otherwise private information.

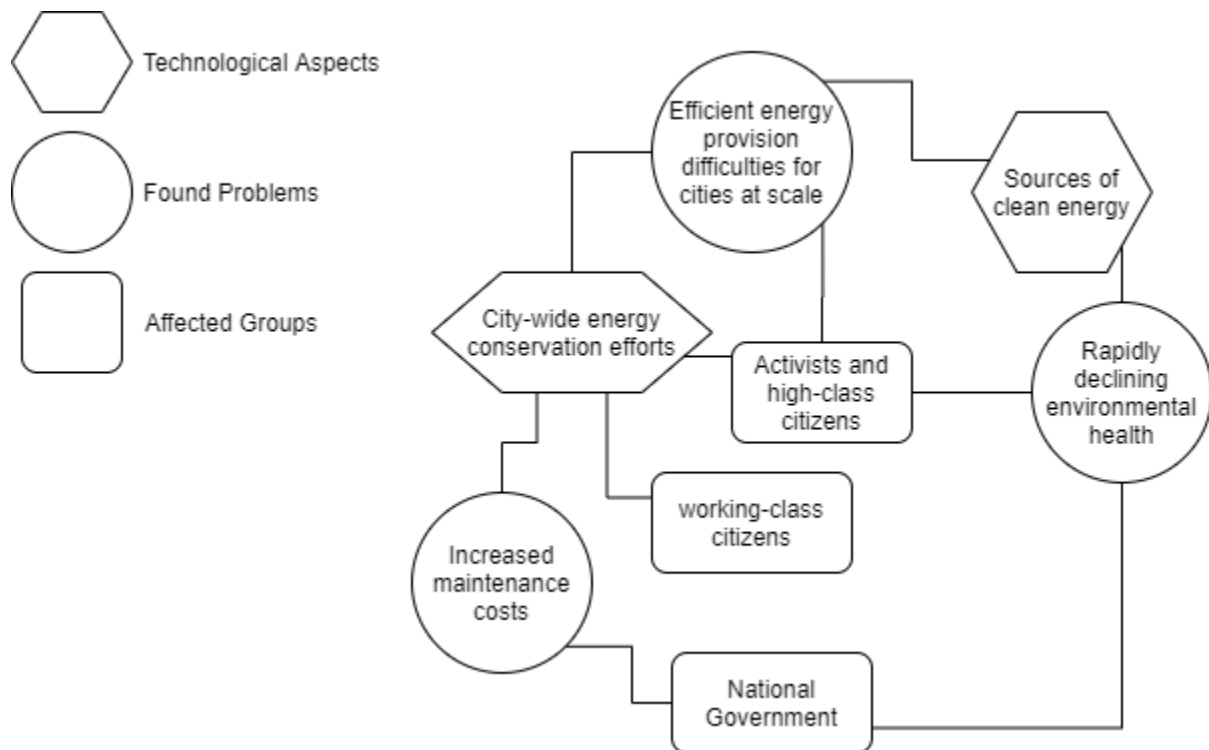
The information regarding the position of energy-based policy and technology in the United States might be well-represented in this SCOT diagram:



A SCOT diagram identifying participants and pieces of the U.S. Energy technology landscape.

On the other hand, interviewees and publishers in China tend to frame this issue as one of public (and community) responsibility. Rather than focusing on the real cost to personal privacy, members of the public recognize this price and value the potential public benefit as more important. This may in part be influenced by the lack of large companies in China which are completely independent of the government. While many corporations in the United States are relatively unaffected by governmental intervention, or they could simply influence governmental figures to look the other way, Chinese corporations often partner with local and federal government to more rapidly distribute their product and influence to more citizens. Because of this, a Chinese citizen might not have the same fear of uncontrollable corporate operations, as the Chinese government should often have the ability to curb reckless corporate activity. Without this fear, a new possibility of proper energy distribution becomes more persuasive; if those in power can be assumed to be acting benevolently, then any watts saved by good practice are being given to those in need.

The influences on Chinese energy policy and technology might be well expressed in this SCOT diagram:



A SCOT diagram identifying participants and pieces of the Chinese Energy technology landscape.

It's important to note some of the reasons why the two countries' approaches to energy distribution and provision might differ by such a wide margin. As has been indicated by the guiding research question and the collected data, the difference in cultures between the two countries warps the social context in which technology is constructed. Two countries, then, might even arrive at very similar technologies—use of wind, hydroelectric, nuclear, or solar power—for vastly different reasons. When this occurs, it's important to investigate the underlying causes of this difference, and the SCOT diagrams are designed in such a way as to highlight those causes.

Conclusion

At a high level, the difference in perspective between China and the United States regarding energy practice and energy conservation boils down to the way each country builds its cultural heritage. However, in both interviews and collection of media resources, one can easily identify the main issues of either side, reckoning with the compromise between personal agency and community empowerment. In this way, it's easy to conclude that the issue of energy distribution and conservation has a number of solutions, each with different qualitative benefits and disadvantages, and the solution which fits a society best tends to fit the cultural background of those most affected by the problem itself.

Appendix

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