Renewable Energy's Land Demands and Native Peoples in the U.S.: An Analysis of Renewable Energy Infrastructure Development on Native Lands

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Ciara Noelle Smith

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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

Advisor

S. Travis Elliott, Department of Engineering and Society

I – Introduction and Background

I.1 - Introduction

Renewable energy technology has recently seen a boom in development and proliferation. Promising strides that have been made over the past few years give hope to societies that depend on fossil fuels to meet their energy demands. Instead, there will be reliance on clean energy sources, allowing the slow-down of damaging, anthropogenic climate change. While hopeful, there are still obstacles to overcome, many of which are related to variability of renewable energy sources and necessity of particular weather and geographical landscapes for efficient energy production. Therefore, determining the location of new energy infrastructure is paramount.

Looking to energy projects in the U.S., areas with ample space and sun are optimal locations for installation of technologies such as solar panels or windfarms. While regions of America like the Great Planes and desert environments were once seen as less-valuable, they can now be impactful in reaching renewable energy installation targets. Of note, these locations are also where Native American reservations often reside. Native American communities, in fact, are situated on ideal areas for solar or wind technology. However, attempted usage of this land could have impact to Native culture and land rights, affecting a group of people that have had to deal with a long history of displacement and disrespect.

This report seeks to evaluate the environment of renewable energy infrastructure on Native lands, particularly focusing on the participants involved and their influence. This evaluation is conducted by utilizing the Social Construction of Technology (SCOT) framework and the three main tenets associated with the research process: interpretive flexibility, stabilization, and technological frame

I.2 Renewable Energy and Its Impact

Societies powered by fossil fuels are responsible for extensive emission of greenhouse gases, and as a result, the hastening of climate change. Rapid climate change impacts sensitive ecosystems, in which humans are a part of and are reliant upon, that are unable to adapt quickly enough. With new, widespread understanding of the potential dangers of climate change, sustainability is in vogue and goals are now set to decrease carbon emission to limit global warming below 2 degrees Celsius above pre-industrial levels. In 2015, 196 parties agreed to the "Paris Agreement", necessitating a reduction of carbon dioxide emissions by 45% from 2010 to 2030. Thinking forward, the goal is to reach net-zero emissions by 2050 (United Nations, n.d.). To achieve this decline in emissions, there has been a boom of renewable energy technology development and implementation. Solar photovoltaics (PV) have become efficient and competitive to other energy sources, and the cost of wind and solar implementations have dropped such that proliferation is reasonable. In fact, in 2020 while coal usage in all sectors declined by 20%, renewables increased by 9%, with wind growing by 14% and solar growing by 26%. Moreover, renewable energy sources generated electricity equivalent to 21% of the total electricity generated in the United States in 2020. This growth is only expected to continue to grow over the coming years (U.S. EIA., 2021).

While renewable and clean energy sources give hope to a better future, they are not without their own set of issues that hold back growth and use and cause the necessity for technical and social evaluation. As renewable energy most often relies on harnessing the power of nature, location is paramount. When considering optimal location for solar or wind farms, one may think of landscapes that are sunny or spacious. But the question arises as to who lives in these locations and how consuming these lands will impact adjacent civilizations. To this end, it

has been found that “even the “greenest” of technologies disturbs land, both directly and indirectly” (Bronin, 2013).

Reports have shown that while Native land comprises approximately 5% of the United States, it can provide approximately 18,000 billion kilowatt hours per year (kWh/yr) (Pierce, 2002). This can be compared to the total US energy demand, 3.8 trillion kWh/yr as of 2020 (U.S. EIA, 2021). In addition to offering areas with open land and bountiful sunlight, Native lands are attractive for energy installations as they are sovereign nations that do not have to adhere to land or environmental regulations. Therefore, there is opportunity for Indigenous people to enter into joint-venture agreements with entities that hope to avoid stifling land usage policies.

Use of Native lands, even for a cause that is typically seen as noble, requires deep consideration. As discussed later in this report, there is a broader context and a long history of Indigenous peoples being disadvantaged by the U.S. government. As is well-known, migration to America and the treatment of Native people resulted in mass loss in many regards, but notably territory loss. This loss was only exacerbated after reservations were set into place due to additional intervention.

The complex relationship between Native and non-Native peoples, and the dark history associated, in conjunction with the hope and possibility associated with clean energy infrastructure inspires the question as to whether or not Native lands will play a role in renewable energy proliferation. Or, instead, these ventures could contribute to the infiltration and destruction of the property that Native peoples have left and surrounding historical, ancestral lands.

I.3 Social Construction of Technology – Background and Applying The Framework

To analyze this topic, the Social Construction of Technology, or SCOT, framework will be utilized. The SCOT framework uses three main tenets to analyze technology and how it is accepted or rejected based on social influences (Klet, 2018). Specifically, SCOT looks at how different actors interpret artifacts, and how these interpretations influence its proliferation. The three-step research process within SCOT includes the evaluation of relevant social groups and their interpretations of a certain aspect or piece of technology, known as "interpretive flexibility". The second tenet is "stabilization", which seeks to analyze how some interpretations have diminished while others gain dominance and seeks to find what definition has risen to the top as opposed to other definitions of the technology, or artifact. The last step is called the "technological frame" and explores the process of stabilization by evaluating broader context. As described in paper "The Social Construction of Technology: Structural Considerations" by Klein and Kleinman, analysis via SCOT can be summarized as such "This three-step research process amounts to sociological analysis of an artifact to demonstrate its interpretive flexibility; description of the artifact's social construction; and explanation of this construction process in terms of the technological frames of relevant social group" (Klein & Kleinman, 2002). Relevant to this report, important artifacts include the energy technology that is being installed or blocked, as well as the land that will be consumed.

II – Participants

II.1 - Relevant Social Groups and Interpretative Flexibility: Participants and Their Stake

As discussed, the first step of the SCOT analysis requires an evaluation of the participants involved in the issue studied, being the relevant social groups. Additionally, the participants' stance must also be considered as flexible interpretation will allow for an understanding of how different groups view renewable energy infrastructure. In the following paragraphs, different groups will be presented, as well as cases that could be representative of their interpretations.

II.2 Participant Group 1 – Native Lands Advocates and Their Concerns

Renewable energy infrastructure proliferation will not be viewed by all as exclusively positive, especially marginalized groups that may continue to be negatively impacted by further interaction with large companies and governmental entities. Instead, new energy projects to some represent another fight to protect culture and ancestral land.

It seems four primary concerns arise that shift perspectives when considering issues related to technology installation on Native land. First, as will be discussed later in this report, Native peoples have a long history of displacement and victimization and the broader context of the interactions between relevant actors create complexity and sensitivity. Second, Tribal land provides resources that allow community members to survive and starting new land projects may impact their living conditions and development. Third, Native lands not only provide tools for survival, but are also culturally significant and disruption of land is disruption of their ancestral territory, influencing social and cultural development for current and future Native peoples (Hart, et al., 2018). These concerns can be understood by the following case.

Land disruption having tangible negative impacts is not a "what-if" scenario. The Colorado Indian Tribe, comprising of more than 4,000 members from the Navajo, Monhave, Chemehuevi, and Hopi Tribes, have already fought against renewable energy installations due to their impact on sacred lands. In the Sonoran and Mojave deserts, the Genesis Solar Energy Project completed construction in 2012, this 250MW thermoelectric solar farm resides on approximately 1,800 acres of land west of Blythe, California (CEC, n.d.). This project was placed along a "pre-contact trade route" that was utilized by Native peoples to trade between California and the Southwest region (Krol, 2021). As such, there is rich history and significance in the area. It is said that the project resulted in the destruction of trails, funerary sits, and cultural artifacts. This destruction was expected, and the project was completed despite the objections and work of the Colorado River Indian Tribes (CRIT, 2012). Out of the 1,800 acres involved in this project, there was a 125-acre area of land that would cause harm if disrupted. Here, almost 300 artifacts including ancient stone tools and other artifacts dating approximately 10,000 years old were uncovered, many being reported as damaged in the process. The Bureau of Land Management (BLM) indicated that there was no conclusive evidence of habitations or human remains, with a "certain threshold" not being reached. Though, Tribal secretary Amanda Barrera indicates that the BLM's evaluation did not account for the Mohave Culture and their tradition of cremating their dead and the dead's possessions. As a result of the destruction, the BLM required the company building the Genesis Solar Project, NextEra, to conduct ethnographic studies of the area, set up scholarships for Native students, analyze the artifacts, as well as develop educational websites to explain the cultural significant of the area. In response to this, one chairman of the Colorado River Indian Tribes, Dennis Patch, described this as "absurd". Tribes even took this

case to court, arguing that federal laws were not followed as to protect cultural resources. Though, this failed (Danelski, 2015).

Reported by a news publication local to the location of this project, investigations found that there was a push to quickly approve this build by the Obama administration and that the build was subsidized. It was found that excluding the 125-acre area of great cultural significance was costly and technically difficult. The destroyed land was adjacent to officially reserved Native land, so federal officials were able to ignore CRIT's objections and begin the build of the solar farm (Danelski, 2015).

Finally, the fourth concern is that large-scale projects are costly at every step, from the evaluation and studies required, to the actual installation. Native communities often do not have access to funds and infrastructure to develop their own clean energy projects, let alone utilize clean energy once the technology is installed (Bronin, 2013). To combat this issue, grants have been set up by groups such as the Department of Energy and the Environmental Protection Agency, but this is not enough. If Native peoples cannot develop their own projects, they will have to enter into agreements in which they are vulnerable. For example, land leasing or joint-venture agreements, which can result in lost revenue and difficulty negotiating energy to their own community members (Bronin, 2013). Relevant to these issues, Zimmerman (2021) states, "concerns about large corporations taking advantage of tribes and disrupting sacred sites is prevalent among Native American communities."

II.3 Participant Group 2 - Native Lands Advocates and Their Hopes

While there are concerns on multiple fronts for proliferation on and around Native lands, some Native peoples are becoming involved with renewable energy projects for the hope of providing their community with new resources.

Energy technology can help to reduce fossil fuel reliance both on Tribal lands and all over the United States, helping not only to reach sustainability goals but also creating new jobs. General improvement of the economy and energy access on Native American reservations gives promise that tribes would be able to become more self-sufficient. Proponents of clean energy projects have argued that Indigenous people in the U.S. would benefit from energy projects on their land, and these benefits are more important than land protection. Improved access to energy would be notable for Native communities as reservation homes are 10 times more likely to be without electricity compared to the remainder of the US (Spears et al., 2020). Additionally, the economic and energy access improvements can allow for more funds to be allocated to education, housing, and other community-centered areas.

By tribes working closely with companies to build this infrastructure, the net-benefits could be positive with little disruption to Native culture and history. For example, in South Dakota, six Sioux tribes advocated for wind energy development in the area. Working with the company Apex Clean Energy in a joint-venture agreement, they have created the largest clean energy project attempted on Native lands, resulting in two wind farms with a generating capacity of 570MW (Clancy, 2018). Plans are set in place to sell renewable power to the Southwest Power Pool. A unique aspect of the joint-venture agreement is that the Sioux tribes have a majority stake in the project at 51%. To this end, the farms are titled 7G Renewable Energy, symbolizing the Sioux's intention that decisions should be made such that the well-being of

people seven generations into the future is upheld. From this, it can be understood the hope that many associate with energy projects. To this end, the Oceti Sakowin Power Authority (OSPA) was founded, an organization that represents the Cheyenne River, Flandreau Santee, Oglala, Rosebud, Standing Rock, and Yankton Sioux tribes, and hopes to proliferate wind energy to benefit Native people's lives and economy (Clancy, 2018).

Another example is the Moapa Southern Paiute Solar Project, a 250MW photovoltaic solar power project that is in the Moapa Ricer Indian Reservation in Southern Nevada. The Moapa Paiutes are a people that have thrived off the land they lived off of and have faced a history of cultural disruption. Settlers entered their region resulting in the seizure of water, home raids by slavers, the spreading of disease, and general brutalization. Their land decreased from 39,000 to 1.56 square miles as a result and the infiltration of settlers continued to affect the tribe, even later leases of farmland to non-members of the tribe resulted in continued loss of land (MBP, n.d.). Despite this, the Moapa Band of Paiutes entered into an unprecedented agreement to develop the first utility-scale solar power plant to be built on Tribal lands, with construction starting in March 2014 (Power, 2014). This solar farm was created to power 111,000 homes in the Los Angeles area. From leases and associated jobs, the solar project has provided income and economic development to this region, and by working with the tribes, land and cultural heritage can be preserved (Business Wire, 2021).

From the multiple cases presented, it can be seen that, to some, renewable energy infrastructure is a symbol of hope and progress. Renewable energy is a new way for Native people's voices and impact to be heard and known.

II.4 Participant Group 3 - Energy Technology Proliferators

Companies and entities that are developing and installing renewable energy infrastructure are going to change the world for the better, or that is the hope of many. Solar and wind farms allow us to enter into a new frontier, hopefully improving energy access for all while achieving clean energy goals. Companies such as NextEra Energy are at the forefront of this progress. As the largest generator of renewable energy in both wind and solar, NextEra hopes that renewables will allow for a power sector that is up to 85% emission free. This goal is emphasized by Jim Robo, the Chairman and CEO of NextEra Energy, "Like so many of you, I have believed in the future of renewable energy for a very long time. Wind and solar energy have made economic sense for customers in many parts of the country for years. As technology has improved and costs have come down, even more customers across the country have realized the benefits of clean energy" (NextEra, 2021).

NextEra is not alone in their hopes, companies like Sunnova and many others also are at the forefront of renewable energy proliferation, with mission statements indicating they seek to champion innovation in energy and provide equitable access; "Sunnova is a leading national residential solar company. We believe in delivering unparalleled service, providing more choices and access to clean, affordable and reliable energy with customized options to fit any home and budget." (Sunnova, n.d.)

There are many more companies than listed already in the renewable energy market, and many more are likely to join. These entities are for-profit companies that seek to maximize their revenue though often still stating their goal is to better the world and proliferate inclusion. The former fact can result in a lack of trust that these corporations will actually be champions for equity as they say they will be. To this end, companies like NextEra insist they have a "strong

focus" on ethics and a commitment to diversity and equity as well as supporting the communities that they develop projects near. But, as seen in the previously mentioned Genesis Solar Project, statements like these may be for show, requiring the necessity for focus on this topic and for accountability to be held.

II.5 Participant Group 4 - Policy Makers

There is an abundance of information and data stating that if the world does not reach net-zero emissions of greenhouse gases by mid-century, the risks are great for humanity. Knowledge and focus on the potential catastrophic impacts of climate change have inspired governments all over the world to set out goals to reduce greenhouse gas emissions, making governmental entities the fourth and final participant that will be evaluated.

While the United States has changed its stance from administration to administration, currently, the country is committed to the Paris Climate Accord, a "global action plan to fight climate change" (Denchak, 2021). To this end, President Joe Biden announced last year that the United States will aim to cut its own emissions by at least 50 percent below 2005 levels by 2030, which is said to be an ambitious goal for a wealthy and industrialized nation (Plumer, B., & Popovich, N. 2021).

Policy makers are a notable actors with resources and power that enable them to set up subsidies and allocate funds for grants to help energy projects flourish. To this end, the U.S. Department of Energy Office of Indian Energy Policy and Programs was formed with the established mission "to maximize the development and deployment of energy solutions for the benefit of American Indians and Alaska Natives" (OIEPP n.d.). This group has conducted geospatial analyses to understand the potential for energy on Indian lands and has created written

reports that aim to provide Tribal governments with thorough information and data regarding renewable energy infrastructure and options for installation. This group is hopeful that renewable energy technology will provide many benefits to tribes, like long-term stabilization of energy costs, economic development, and strengthened Tribal energy infrastructure (NREL, n.d.). Not only is there hope to improve Tribal communities, but also to expand energy production to contribute to the grid, contributing to the efforts to meet national goals.

III - Stabilization

III.1 - Outlook of Proliferation: Stabilization

The second step of the SCOT analysis method, stabilization, features a stabilized artifact that is the result of both time and social construction. From analyzing different social groups and case studies, it is clear that closure has not been achieved, and thus, stabilization will continue to develop. Conflicting views may continue to rise regarding technology installation, and if it is the overarching good or if it is a tool to shift control of Native lands away from Native peoples, as proliferation grows.

A sense of consensus can be found in that energy on Tribal lands can be mutually beneficial, but this is given that energy companies will be willing to enter into joint-venture agreements with minority control of power, or financial help from grants and subsides. Finding these ideal situations are easier said than done, and likely there will be a sense of vulnerability in Indigenous communities due to the broader context of Native peoples and their land, which will be described in **Section IV.**

Conflicting viewpoints on a particular artifact eventually diminishes. A consensus will be reached as certain interpretations gain dominance and meanings placed upon an artifact (i.e.

renewable energy technology and land) converge. Though, renewable energy technology is still new, and installations will only grow over the next few decades. Therefore, the current environment may be the beginning of a long road of social construction to achieve closure.

IV– Technological Frame

IV.1 - Broader Context: Technological Frame

The final research step in SCOT is to evaluate the issue from a "technological frame". The role of this step is to analyze the stabilization of an issue and interpret it in a broader context, or theoretical frame. This concept serves as a way to understand the interactions between relevant social groups and how these interactions shape interpretations and thus eventual closure (Administrator, 2020). Looking at an issue such as using Native lands, there is important history that must be known that emphasizes the impact of further loss of land control. The entire history and experience of Indigenous peoples in the United States remains unknown due to a lack of written records. However, a recent study of approximately 300 tribes found that Indigenous people in the United States have lost almost 99% of the land they originally occupied due to land dispossession and forced migration. Occupation of European settles began a pattern of Indigenous peoples being pushed out of their homes, with it being intensified in the form of

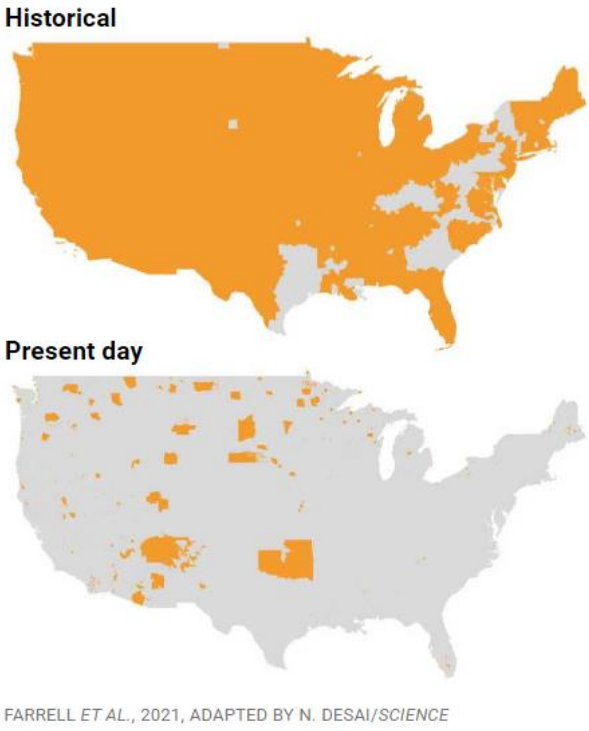

Figure #1 – Native Land Ownership Over Time (Wade, 2021)

forced migration in the 19th century (Wade, 2021). While Native nations initially ceded territory in exchange for smaller, yet secure allotments of land, in the 1880's the U.S. instituted new legislation that allowed for Native Americans to lose ownership and control. As a result of the General Allotment Act of 1887, land was further fractured or "checkerboarded", leading to a loss of 90 million acres. It is said that "generations of Native Americans have been robbed of their economic, cultural and human potential" (ILTF, n.d.).

Native peoples have been forced long distances to new homes, both far away from their ancestral lands and into historically less-valuable geographical locations. This excluded them from other institutions and locations in the United States, specifically excluding them from the U.S economy and energy market due to decreased access of resources (Funk & Hefferon, 2021).

Concerns of outsiders coming into the little land left that is sovereign to Native peoples are legitimate, as is trepidation to involve outsiders into the community. Though there is a complicated relationship between the relevant actors, many argue that the benefits of renewables, such as the economic gain and improved energy grid for Native peoples, overshadow this. Optimistically, entering into deals with energy projects should be a net benefit for all. But this brings attention to an additional piece of the puzzle - many Native lands also lack the infrastructure that would allow them to reap the benefits of any installation on their land (Bronin, 2013).

Many Native communities lack both infrastructure and capital that will allow them to develop their own energy projects and transmit that energy to the community members. While grants and other forms of assistance are set in place, it is nowhere near enough to uplift communities to ensure they are controlling the project (Bronin, 2013), which contributes to the

lack of stabilization of this issue. For equitable stabilization to occur, programs should be set in place to provide the necessary resources.

V– Concluding Thoughts

V.1 - Conclusion and Recommendation

Driven by the scientific and societal consensus that the world must change in terms of energy sources, renewable energy infrastructure is seeing massive development and installation. This growth, which is needed to decrease greenhouse gas emissions from fossil fuel usage, will only continue to grow in the near future.

Renewable energy technologies are sensitive to the location they are installed in, and also require significant amounts of land so that there is an appropriate amount of sun or wind energy to allow for efficient energy production. It so happens Tribal lands are prime geographical locations for these projects. Though, the complexity of this topic can be understood by a broader context and a long history of Native land dispossession and disrespect. While some Native people look to renewable energy projects as an exciting new venture to improve their community as well as contribute to global change, others have not been able to have their voices heard about concerns related to installations. These participants as well as outsiders like energy technology proliferators and policy makers interact to decide the future of renewable energy on Tribal lands.

While little stabilization can be confirmed, and this topic not yet closed, it is hopeful that multiple tribes have been able to successfully work with companies to begin projects with the voices of Native peoples being heard. This report concludes that renewable energy infrastructure could be successful and reap many benefits for those within Native communities, and outside. However, the community members that reside on these Tribal lands must have a majority voice

in these projects, and more assistance must be given in order to ensure that the infrastructure being placed may also reach the surrounding community members.

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