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Technology Transfer of Renewable Energy Resources for Women's
Empowerment and Country Development

Abstract

Across the world, women are disproportionately impacted by a severe lack of energy security (Oxfam 5-6). Such energy insecurity results in little to no access to safe, reliable, efficient, clean, and affordable energy resources. This is especially an issue for impoverished women in developing countries, who often live in rural areas. Women who live in energy poverty do not have access to renewable non-traditional sources of energy, such as wind or solar, to provide electricity and heat. Instead, they are forced to use traditional energy sources, namely burning biofuels like wood and dung. The time and energy spent to gather and use traditional energy resources cyclically stops girls and women from finishing grade school, and becoming involved in their economies to help benefit themselves, their families, and their countries. A switch to renewable resources, as opposed to non-renewables, will give women more opportunities and will also assist developing countries to develop in a cleaner and more environmentally friendly way.

Through a qualitative approach, I present why this issue is important to tackle, and how to do so. Additionally, I will provide three suggestions for general policy solutions derived from the epochs of the Environmental Movement (Kraft et al). I will discuss why such a transfer would involve developed countries having access to the technology for renewable energy resources and why they ought to share that technology with developing countries. Impoverished women may be freed from many time- and energy-intensive tasks that they fulfill to provide for

themselves and their families. This would allow women more time to educate themselves, and to become in turn more financially independent by involving themselves in local markets.

Introduction

There are plenty of social, economic, and environmental issues and injustices across the world today to be solved. Most of the time, and for a long while, people have tried to solve issues in these different areas of our society by looking at them completely separately and by offering solutions that may do well for one issue, while hurting another. It is imperative that we recognize the intersectionality of social, economic, and environmental issues. By “intersectionality,” it is meant that these three societal spheres are extremely interconnected, and that they create interdependent systems that require equally intersectional solutions.

Before discussing the goal of my essay, I would like to define a few terms. “Globalization” refers to the process by which people, institutions, organizations, and businesses become internationally integrated through various social, economic, and cultural aspects. A “developed” country is one that is industrialized and rather economically stable. A “developing” country is usually agriculture-based, with an unstable economy that seeks to advance industrially, economically, politically, and socially.

In this essay, I will offer one example of an intersectional solution to environmental, social, and economic issues. I suggest employing the technology transfer of renewable energy resources from developed countries to developing countries, which is made possible by the ever-expanding globalization processes. Technology transfer of renewable energy resources will create energy security for marginalized and impoverished women in developing countries. This will then allow these women more time to pursue an education and/or then become involved in their local, national, and international economies. Thus, by uplifting and empowering women in

poverty, they are able to become actors in and stimulate markets within their countries to help move their countries closer to total development.

Additionally, this intersectional solution could be a clever way to attack the pressing environmental issue of climate change. Instead of advancing through the use of dirty energy, such as coal and oil, as all developed countries of today did, developing countries can skip that middle step. As a result, the potential for such countries to generate detrimental environmental impacts through the stages of their industrial development would be drastically decreased. Furthermore, women can be key players in working for the implementation of environmentally-protective and anti-climate change policy, given the right tools and opportunities. In fact, women are more likely than men to fight for peace and for legislation that promotes environmental protection (Stevens 5). When a woman has the ability to pursue an education, she has access to much more knowledge, opportunity, and credibility to become involved with her government and its production of progressive environmental legislation.

Finally, I will analyze policy solutions—command and control, market-based initiatives, and sustainable communities—from the Three Epochs of the Environmental Movement. This will help to outline various ways that my suggested solution of technology transfer may be most effectively carried out. Through an analysis of a variety of policy solutions from the three epochs of the Environmental Movement, it will become clearer that technology transfer of renewable energy resources—which will help mitigate climate change impacts—can be the driving force behind such a transition of developing countries to developed countries. Such an intersectional solution will allow women more time to get an education, and thus become involved in local, national, and international economies.

Part I: What, Who, and Why

Technology Transfer

To start, I will define and exemplify the importance of technology transfer and discuss how it can be used. In short, the concept and process of technology transfer involves the passing of information—technology of any sort, know-how, how-tos, and perhaps even physical technologies—from one entity to another. As defined by the *Global Environment Facility*—an international partnership of countries, international institutions, civil society organizations, and the private sector that aims to address environmental issues across the globe—technology transfer helps agents to “... [mitigate] and [adapt] to climate change amongst different stakeholders such as governments, private sector entities, financial institutions, non-governmental organizations (NGOs) and research/education institutions...” (3). It is for this reason we ought to employ technology transfer processes with social and environmental issues in mind.

To elaborate, technology ought to be transferred from developed countries to developing countries, wherein developed countries share renewable energy resource technology with developing countries. There are extremely important aspects of this process to be mindful of. Most significantly, technology transfer cannot occur as a one-time event. Change will not effectively occur by handing a country tools and technology and then wishing them luck while leaving. Technology transfer has to occur through a helpful, long-term relationship that includes coaching, aid, cooperation, and patience (Global 4). In order for successful transfer to happen, there must be clear communication and a comprehensive approach to all areas that need to be addressed.

The previously referenced organization, *Global Environment Facility* has done a great deal of work transferring environmentally-conscious technology to developing countries, which I

will address in further detail later in this essay. Next, I will continue by addressing the topic of climate change, and discuss why I have chosen to argue for the technology transfer of renewable energy resources, over non-renewable energy resources, or even a combination of the two.

Renewable Energy Resources

A goal of this intersectional solution is to work to combat climate change. Developing countries will strive to develop no matter what, so it is preferable that they expand their capacity to use clean energy that will have little to no negative effects on the global environment. To build on that sentiment, I would like to make it clear that I do not believe developed countries have the right to tell developing countries to not develop, or how to develop, for the sake of preserving the environment or for any reason. However, through this proposed technology transfer, developed countries have the ability to influence how developing countries industrialize depending on the technology that they make available for transfer; renewable energy resources thus help achieve advances in technology, sustainability, and gender equity.

One of the many factors that files a country under “developing” is the type of energy used. Currently, households in developing countries often use what is referred to as traditional energy. Traditional energy includes biomass for burning such as wood, dung, and other organic scraps. As an area or a country becomes more developed and prosperous, it moves up the energy ladder into more clean, efficient, and comfortable energy resources. Below, courtesy of *Sustainable Us*, is an example of an energy ladder. It details the types of energy used by households of different income levels. Additionally, renewable energy resources are not explicitly mentioned in Figure 1. That is because renewable energy resources fall under the category of “electricity,” since electricity is the final energy of the primary energy that results from renewable energy resource technology.

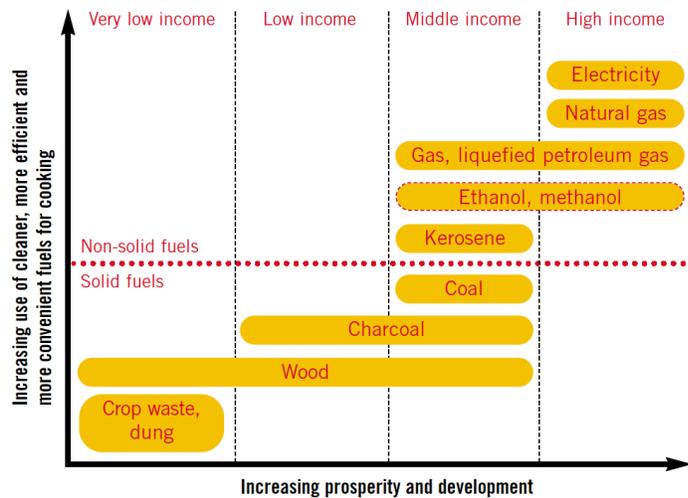


Figure 1

Through technology transfer of renewable energy resources, developing countries will be given the opportunity to engage in a technological leapfrog. A leapfrog occurs when a quick change or massive innovation allows for an entity to skip over the intermediate steps of a process, to the later steps of the process (*Leapfrog*). In this case, technology transfer would allow developing countries to industrialize without going through the environmentally-malignant middle steps in contrast to currently developed countries. Still, developed countries get a large portion of their energy from non-renewables such as oil and natural gas. Many countries, such as the United States, continue to use coal, one of the dirtiest and most destructive energy resources.

We understand that developing countries will develop, and some are well on their way. Instead of developing with the same resources that developed countries used, which have been detrimental to the environment and human health, developing countries can skip straight to clean, renewable energy resources to help make them competitive in the global economy. As José Goldemberg, of the University of São Paulo, Brazil, says,

... developing countries have a fundamental choice: they can mimic the industrialized nations, and go through an economic development phase that is dirty, wasteful, and creates an enormous legacy of environmental pollution; or they can *leapfrog over* some

of the steps originally followed by industrialized countries, and incorporate currently-available modern and efficient technologies into their development process (730).

Of course, developing countries cannot necessarily be expected to skip these steps on their own, since most renewable resource technology is not readily available in countries not yet fully developed. Through the technology transfer of renewable energy resources, developing countries could skip the dirty middle steps of the industrialization process, and leapfrog straight to clean, renewable energy.

Impacts on Women in Poverty

Women in poverty are also living in energy poverty a majority of the time, especially in developing countries. Energy poverty involves a lack of safe, reliable, quick, affordable, clean, and environmentally-benign energy services, such as electricity and cooking installations. On the other hand, energy security can be defined as the safe, reliable, quick, affordable, clean, and environmentally benign energy services (González). Developed countries are generally much more energy secure than developing countries, which explains why impoverished women in developing countries have very little access, if any, to safe and reliable energy services.

It is important to note the impact poverty has on women, their families, and their local and national communities. As women are certainly important economic actors, their poverty and lack of involvement in the economy stunts its growth (Buvinić 39). Women are the exceedingly overlooked key to economic growth and progression, which makes a notable difference in developing countries. Clean energy security is the first step to allowing impoverished women in developing countries to pursue an education, become more independent, and participate actively in their economies.

Currently, impoverished women in developing countries often use traditional sources of energy. While their husbands spend the day out, making an income for the family, women are frequently expected to stay home and take care of the children, which primarily involves cooking. To cook, women must gather biomass to burn, such as wood, dung and other organic scraps. The process of gathering these materials is extremely time-consuming, cumbersome, and often dangerous. Furthermore, the gathering of these materials for survival of the family must be done during the daylight hours, as rural and forested areas of developing countries are not artificially lit at night. When her day is not spent gathering biomass to burn, a woman living in poverty is taking time to cook and care for her children. Thus, if impoverished women in developing countries had continuous, reliable access to renewable energy resource services, they would not need to spend time gathering biomass for cooking, heating homes and heating water. With energy services that would allow women to cook in their homes without using biomass, thus alleviating their obligation to gather the materials, women and developing countries as a whole would be propelled up the energy ladder.

This newly freed up day would allow women and girls the chance to go to school to pursue an education. Additionally, energy services such as lighting from renewable energy and resource-based electricity can extend a woman's day. She or her children may now be able to study at night by electric light. She will likely have more energy to spend time studying or bettering herself, her family, or her community in other ways. So, in this situation where a woman's time becomes more liberated through the energy services she has access to, she has the ability to go to school or get directly involved in the economy.

One might wonder why women and girls in developing countries are not in or have not gone to school. In impoverished areas of developing countries, girls are the first to be pulled out

of school (Gender). In poor communities, families often only have enough money, resources, and time to send some, if any, of their children to school. Boys are seen as the future providers, so they are usually allowed to attend grade school for some amount of time, if the family is able to support that. Conversely, once girls reach reproductive age, they are often pulled out of school, if they had been in school in the first place, to be married, start a family, and begin to fulfill their domestic duties. Access to clean, safe, reliable renewable energy resource services would give girls the opportunity to finish school, become involved in their economies, earn an income, and gain independence as a result.

Regarding climate change, which I am also working to address with this technology transfer solution, women can contribute to the change we need to combat climate change and environmental degradation. Firstly, it is important to recognize that marginalized women are among the most severely impacted by climate change impacts. To accentuate this point, Greenpeace informs us that by 2050, the amount of climate refugees could increase to 150 million and that 80% of these refugees will be women and children. As women usually spend most of their time performing domestic labor duties, they lack the time to invest into adapting to the effects of climate change. Additionally, climate change can make women's domestic chores harder. As rising global temperatures dry out water and land, it is increasingly more difficult for women to locate water and to tend to crops, if they live an agricultural lifestyle (Female). Although women are disproportionately affected by climate change impacts, they can be a significant and pivotal factor addressing climate change and supporting environmentally-protective policy.

Currently, women still tend to be absent at most levels of government, and especially in climate change decision- and policy-making processes (Denton). As previously mentioned,

women are very likely to support peace-promoting and environmentally-conscious legislation. Thus, if women are enabled to pursue an education and involve themselves in the economy through secure renewable energy resource services, they will then also be allowed the opportunity to become more involved in government and policy, and will likely fight for climate change regulations. This will perpetuate a new, socially, economically, and environmentally-healthy cycle.

Visualizing the Cycle

Now that the logistics of my thesis have been explained, this next figure should be simple to understand. To supply visual aid to my thesis, I have created a cycle that will explain the process of transferring renewable energy resource technology to developing countries to aid impoverished women, allow them to get involved in their economies, and thus continue the cycle. Throughout my research, I have not found any image or cycle like this, which explains why I am not citing anything in this section, and why my cycle was not inspired by any other source. Below is Figure 2, which includes simple explanations for each step of the cycle. I will further explain the cycle below Figure 2.

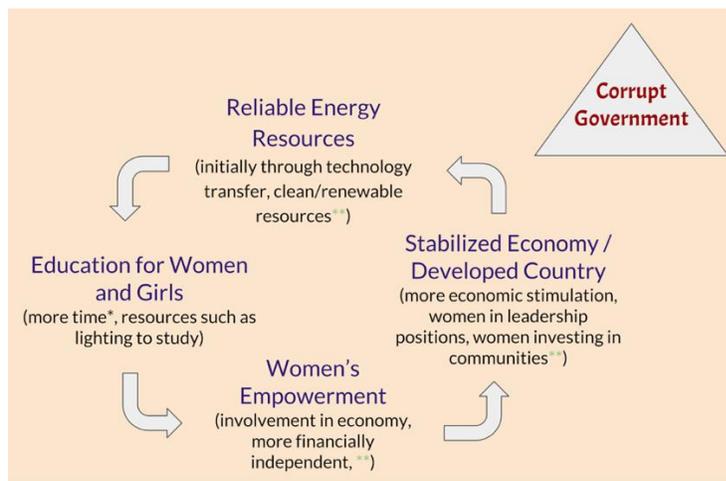


Figure 2

In the situation and process that I present, the first step of this cycle is Reliable Energy Resources. Through technology transfer of renewable energy resources from developed countries to developing countries, environmentally-benign energy services will be made available to impoverished people. I have placed two green asterisks in the description of this first step to indicate that it has a “green component.” This green component indicates that the reliable energy resources would come from renewable energy, so as to help developing countries industrialize and develop in the cleanest way possible.

After Reliable Energy Resources, we have Education for Women and Girls. As we have gathered throughout this paper, safe, reliable, affordable, clean access to energy services alleviates women of much of the duties limiting their time. Instead of focusing on gathering biomass, water, and other crucial resources, women can spend time pursuing an education, studying, getting involved in their economies, and putting their children through school.

Next, as we now know, women's and girl's education leads to their own empowerment. As mentioned, educated women are enabled to become actors in their local, national, and international economies, which is beneficial for everyone. Better educated women also have more of a chance to become present in government and policy-making. As they do so, women are likely to support environmental protection policies, producing the green component for this step.

Finally, after the first three steps we hope to see a stabilized economy and developing country. At this point, a capable and much larger portion of a national population would now be working and stimulating the economy. This, along with the clean energy security established, would provide a developing country with stable ground to develop successfully and efficiently. Notice that after this step, the cycle continues from the first step. This is because a stabilized

economy and developed country will likely maintain the infrastructure and services of reliable, clean energy resources.

However, this cycle is not completely irreversible or impenetrable. A corrupt governmental structure or government agents can often be a key trait of countries politically and economically unstable. So long as the transfer is done following the proper steps and conditions, the only foreseeable issue is a corrupt government. At any point in the cycle, a corrupt government may interrupt it and bring it crumbling down. This can happen by selfishly defunding energy resources, by destroying or not maintaining energy resource and service infrastructure, or by any other mean that may stop this positive cycle from perpetuating itself. Unfortunately, the complexity of a corrupt government is far too broad to cover and try to solve within this paper. Thus, I choose to recognize the fact that this cycle is not unbreakable, but that in the proper setting, it can instigate incredible outcomes.

Part II: Policy Solutions

As discussed, there are many ways that the technology transfer described can be implemented. The solution I have presented is one affecting both environmental and social issues. In their book, *Toward Sustainable Communities: Transition and Transformation in Environmental Policy*, Michael Kraft and Daniel Mazmanian discuss the three epochs of the Environmental Movement. These three epochs describe how environmental policy implementation methods have changed throughout the decades since the beginning of the environmental movement in the United States (Kraft 7). The first epoch of the environmental movement refers to *command and control* legislation, and it was popular in the United States from 1970 to about 1990. The second epoch of the environmental movement refers to the *market-based initiatives* used to incentivize companies and corporations to reduce their carbon

footprints. This was especially popular in the U.S. from about 1980 to the 2000s. Finally, popular from about 1990 to the present day, the third epoch of the environmental movement is called *sustainable communities*, and it aims to sustain long-term human and natural needs (Kraft 8). For the remainder of this essay, I will discuss the details of each policy implementation style, and how they may work in the situation I presented in Part I of this essay.

Epoch 1: Command and Control

Command and control policy solutions are extremely beneficial when aiming for efficient and influential legislative development. The best way to change a wide-spread, national issue is to leave it up to the federal government to take the lead and manage. Generally, this policy solution is aimed at mitigating pollution caused by business and industry, but it is not restricted to that. The major policy tool used in command and control regulation is heavy federal funding (Kraft 8). Although command and control policy solutions have proved to be quite effective in developed countries like the United States, they might not work as well in developing countries.

A key characteristic of most developing countries is an unstable or corrupt government. Because of this, the government of a developing country on the receiving end of a renewable energy resource technology transfer may not have the human capital to maintain such an infrastructure needed for the creation and dispersal of energy. Additionally, governments of developing countries would likely lack the funding to support this kind of policy implementation. So, while command and control policy solutions of the first epoch of the Environmental Movement can be very effective for developed countries, there is uncertainty whether they will be as efficient in developing countries on the receiving end of a renewable energy resource technology transfer.

Epoch 2: Market-Based Initiatives

As the name infers, during the second Epoch of the Environmental Movement, there was a push toward environmental regulation through market-based and collaborative methods. While command and control policies are implemented and carried out at the federal level, market-based initiatives are usually focused on the state and local level. This is done with the goal of increasing compliance by companies and corporations (Kraft 8). An example of a market-based initiative would be a cap and trade program, in which factories of an industry are given an allowance of carbon emissions for a period of time. Factories may sell their allowances if they find that they can lower their own carbon emissions, thus providing financial incentives to lower carbon emissions by a particular industry.

This policy solution can be very beneficial in the case of regulating industry, companies and corporations. However, it may be difficult for weaker markets – another characteristic of developing countries – to support this type of policy implementation. In comparison to command and control regulation, market-based initiatives may be inferior for this particular situation. It is more difficult to have confidence in market-based initiatives in this case, because the markets are often more fragile and may lack the necessary physical and cultural infrastructure. Therefore, within the context of global technology transfer, the effectiveness of a market-based policy solution is limited.

Epoch 3: Sustainable Communities

Finally, the most recently popular environmental policy solution is called Sustainable Communities. Epoch three is characterized by sustainable communities, that is, communities that use enough resources to meet their own needs, but not so much that they compromise the needs of future generations. By definition, the proponents of sustainable communities approach (Kraft

and Mazmanian's "third epoch ") seek to harmonize humans and their natural environment (Kraft 8). The best way to allow for this harmonization is to put community leadership, women's liberation, and environmental sustainability in the hands of the local people. Assuming this policy is successfully carried out, it could effectively address the issue of localities that may tend to be stationary in terms of moving toward more sustainable environmental and more socially equitable practices.

Although the word "community" tends to evoke a sense of smallness and closeness, this policy solution is not regulated to local level implementation only. Policy solutions targeting the creation of sustainable communities can be implemented at any level, from the local to the global. Regardless of the level of implementation, the most important aspects to focus on are the outcomes and performance of the policy solution (Kraft 9). Considering my proposal for an international renewable energy resource technology transfer, aimed to liberate oppressed women, the third epoch environmental regulation would be the most effective. This would give women the "power of power" and allow them to take control of their lives, education, and collaborate with others on their communities' human and environmental needs.

Conclusion

In an ever-globalizing world, renewable energy resource technology transfer becomes more practical everyday. Such a transfer would liberate women from the confines of the sunlight hours and chore-burdened days. With this new freedom, women would be able to educate themselves and their children, enabling them to become involved in their economies and allowing them the opportunity to represent themselves and their communities in governmental decision-making. Additionally, a technology transfer of this kind would help mitigate the climate

change crisis by influencing developing countries to industrialize in a clean, environmentally-friendly way.

There are three general approaches, derived from the three epochs of the Environmental Movement, that may be taken to implement such a technology transfer. Command and control, market-based initiatives, and sustainable communities policy solutions may be implemented in any combination. It is crucial to note that the use of all three policy solution styles are not mutually exclusive. However, in my opinion, a policy approach focused on sustainable communities would be the most beneficial and effective way to efficiently and effectively carry out a technology transfer. With the proper policy solution(s) to support its implementation, the globalization-driven energy technology-based solution that I present can contribute to solving this economically, socially, and environmentally intersectional issue.

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