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Analysing the Gain/Loss in Resource Wealthy Countries as a Result of the Shift to Renewable Energy

Abstract

A global transition towards sustainable energy brings benefits and detriments to the world's economies. While a staple of the world economically and functionally, fossil fuels have led to a significant increase in global temperatures, threatening the stability of the environment, forcing the world to commence a transition toward renewables. This paper will analyse three countries in different economic situations regarding this transition: Saudi Arabia, Norway, and Bolivia. Saudi Arabia has established itself as a world leader in the crude petroleum industry, and its economy is heavily dependent on it. Becoming economically sustainable in the post-oil world will require the Saudi government to keep developing its Public Investment Fund, the private sector through subsidising industries such as renewables, tourism, and entertainment, and utilise income taxation to support public expenditures. While emerging as a leader in renewable energy and poised at the forefront of the fight against climate change, Norway remains solely economically fossil fuel dependent. To continue becoming more sustainable, it must continue to expand on its Sovereign Wealth Fund and continue developing the maritime, seafood, and hydropower industries. On the other hand, Bolivia is currently one of the poorest and most unstable countries but has vast, untapped potential in the renewable world due to its lithium stores. Bolivia's success will depend on its ability to maintain a stable government, form partnerships with private firms to develop and access technology to mine lithium, invest in infrastructure to transport and process it, and engage with foreign countries to trade it.

Introduction

Countries globally are currently engaged in developing policies to mitigate against the risks of climate change and energy crises. The problem of climate change has been increasingly discussed over the past few decades, as its risks have become apparent. As a response,

governments worldwide have taken steps to mitigate the risks of climate change, and the primary way to do this is by ceasing fossil fuel combustion for energy, and transitioning toward renewables. This shift brings with it both negative and positive implications for resource-wealthy countries. Countries dependent on oil and natural gas will be forced to diversify their economies to the point where they will be sustainable in the post-fossil fuel world. Their ability to do this and do it quickly enough will depend on several factors, such as a strong government, a versatile economy, and flexibility to move into other industries. This paper will analyse the economic consequences of the global transition towards renewable energy by examining three countries, Saudi Arabia, Norway, and Bolivia, all in extreme positions who stand to gain/lose a significant amount as a result of this transition. Two countries, Saudi Arabia and Norway, are in a similar position to the one mentioned above, in depth to examine their current economic policy in regards to this problem, and to offer insights into such policies. The third country, Bolivia, will be analysed due to its unique position as a country rich in lithium, which stands to gain from increasing demand for renewable energy. However, as a relatively corrupt, unstable, and poor nation, they have not yet been able to capitalise, and could fall subject to another example of the resource curse. However, this transition is not limited to the three countries aforementioned, and all governments must have policies in place to remain flexible and to keep up with this change.

The Challenge of Climate and Energy in the 21st Century

Over the past few decades, the world has become increasingly aware of climate change and the risks associated with it. This is primarily due to the excess of greenhouse gasses present in the atmosphere. When released into the atmosphere, they are able to absorb infrared radiation, re-radiating the sun's energy, essentially trapping in its heat. This process is known as the greenhouse effect, and it creates a dangerous feedback loop environmentally, as rising temperatures contribute to rising sea levels, wildfires, heat waves, and other extreme weather circumstances, and since the ice is responsible for reflecting sunlight, the melting of it will lead to more and more heat being absorbed by the earth. The negative effects of climate change are not only limited to being environmentally related, however. Socially, mass migrations are a

certainty. As the World Bank estimates, rising sea levels that could destroy coastal cities and islands in three regions (Latin America, sub-Saharan Africa, and Southeast Asia) could create as many as 143 million climate refugees by 2050.[1] Hundreds of millions more would also come from other regions as well, such as islands in the Pacific and the West Indies, and coastal cities around the world, bringing the composite UN estimate for climate refugees to approximately one billion people worldwide. Economically, rising sea levels and global warming has the potential to lead to severe negative impacts in several sectors, such as agriculture and infrastructure. The global GDP would drop considerably if actions are not taken to prevent temperature rising, as by 2050, the world GDP would drop 18 percent if no actions are taken, but only 4 percent if the Paris Agreement goals are met.[2]

During the past century, human activity is responsible for raising global carbon emissions nearly tenfold, from 1 billion metric tons in around 1914 to just under 10 billion in 2014.[3] More than half of the carbon emitted into the atmosphere has come from the past 3 decades, ever since the United Nations established its framework convention on climate change. The bulk of global carbon emissions comes from, expectedly, the combustion of fossil fuels, such as coal, natural gas, and crude oil for energy. Consequently, the world and its governments have taken active steps to move away from fossil fuel combustion as a primary energy source, and move toward renewable energy, such as hydropower, wind power, and solar power. Apart from emitting fewer greenhouse gases into the atmosphere, it provides additional diversification to energy sources. The earth's resources are not finite, and sooner or later, the coal, natural gas, and oil storages will run out, and making the switch to renewables as soon as possible will mitigate the risks that come with not having enough resources.

As a response to these risks, in 2016, the majority of the world's countries signed the Paris Agreement to combat climate change. The main long term goal of the Paris Agreement is to keep the increase in global average temperature to well below 2 degrees Celsius above pre-industrial levels, and to pursue efforts to limit the increase to 1.5 degrees, and this can be met by aiming to peak greenhouse gas emissions from most countries as soon as possible. Investing

[1] https://www.brookings.edu/research/the-climate-crisis-migration-and-refugees/
[2] https://www.swissre.com/media/news-releases/nr-20210422-economics-of-climate-change-risks.html
[3] https://www.epa.gov/ghgemissions/global-greenhouse-gas-emissions-data

in and implementing clean energy sources such as the usage of electric cars, wind, solar and hydropower plants, to name a few, is going to be the primary way to reach this goal. Becoming carbon neutral by the middle of the century is a considerably optimistic goal, and has the potential to bring about many risks to countries that are overly dependent on fossil fuels. However, while several countries will bear the brunt of the force from this decision, a few will actually benefit from it. Countries that have large storages of natural resources essential to the renewable energy efforts will, if they can harness their resources, make a lot of money from them. One example of this, which will be further discussed later on in the paper, is the country of Bolivia, which has one of the world's largest lithium reserves, a key element in the production of batteries. If Bolivia is able to capitalise on their vast lithium stores, estimated to be around 9 million tonnes, it will set them up very well in a post-oil world.[4]

Currently, the world's liquid fuel consumption is just under 100 million barrels per day, and the countries leading in crude petroleum imports are China (20.7%), the United States (12.4%), and India (9.4%).[5] On the supply side, the market is dominated by Saudi Arabia (14.7%), Russia (12.5%), and Iraq (7.5%).[6] Fossil fuels have been a cornerstone of many global economies, and have been since the eighteenth century Industrial Revolution. Undoubtedly, the world is addicted to fossil fuels, and moving away from such an addiction at this level could come as an expense to the countries who have used it as a foundation to build upon. Middle Eastern and Nordic countries who are dependent on it for a sizable amount of their exports, fiscal revenue, and employment will undoubtedly suffer if the transition to renewables does not occur smoothly. Countries who import large amounts of it will also suffer, as they will be forced to quickly come up with a solution to meet a growing energy demand. However, there are also countries that are in a position to benefit from the switch to renewable energy, as they possess resources that will have increased demand once the transition to renewable energy finishes. This leads into the most challenging part of the climate change conundrum: making the transition to

[4]https://www.reuters.com/article/us-bolivia-lithium-exclusive/exclusive-bolivias-new-lithium-tsar-says-country-should-go-it-alone-idUSKBN1ZE2DW
[5] https://www.eia.gov/outlooks/steo/report/global_oil.php
[6] https://oec.world/en/profile/hs92/crude-petroleum

renewable energy quick enough to try to halt global warming, while also not being too quick where it harms the countries who are dependent on it.

The first country that this paper will be analysing is Saudi Arabia. Saudi Arabia is the world leader in crude petroleum exports, which is the cornerstone of their economy. They are heavily dependent on the price and production of it, and have only recently started to take steps to diversify. Their economy is still so reliant on oil that they need to find a new industry to move into once demand for oil falls.

The second country that this paper will be analysing is Norway. Norway is also a big exporter of crude petroleum, but compared to other crude dependent countries, is in a much better position to handle the transition. They have already diversified their economy into other industries, and have a large public investment fund to support their government. They would take a hit when the transition comes, but would weather the storm well.

The final country that this paper will be analysing is Bolivia. Bolivia is one of the countries that would stand to gain the most from renewable energy, as they have one of the world's largest supplies of lithium, which is used for batteries. However, at the moment, it is very hard to capitalise on it due to how expensive it is to mine. Bolivia is also a considerably poor country with issues politically.

Saudi Arabia Case Study: Overreliance on Oil and a Difficult Transition to Renewables

The crude petroleum industry is dominated by mostly Middle Eastern countries, and sitting atop that list is Saudi Arabia. Saudi Arabia's economy is heavily dependent on the crude petroleum market. It possesses one fifth of the global oil reserves, which are typically located in the Eastern Province and the Kuwaiti-Saudi neutral zone. While the country of Venezuela has the largest oil reserves in the world, with 303 billion barrels of proven oil reserves, Saudi Arabia has been able to dominate the oil market because its oil reserves are economically worth it to produce. They are typically found close to the surface, and can be extracted without oil prices being in the triple digits. Additionally, this is something that will provide them with increased

stability when oil demand and price reduce significantly, as they can still produce with profits even at a lower price.[7]

Consequently, oil has been the foundation for the Saudi Arabian economy, as it comprises 40 percent of their GDP, 90 percent of fiscal revenue, and 75 percent of exports.[8] It is heavily dependent on oil, and as the statistics show, has not diversified their economy to the point where they would be sustainable if global oil prices and demand were to take a hit. Expectedly, Saudi economic health has tracked oil prices throughout history. A positive oil demand shock brings with it increased GDP and employment to the country. This is perfectly represented during the 2000s, as in 2003 oil prices experienced a dramatic increase, creating 1.7 million jobs within the decade and boosting the large oil businesses that drive the economy.

However, a negative demand shock would bring opposite effects, and since oil prices have been declining significantly since 2015, the Saudi Arabian government has realised the negative impact that the withdrawal of petroleum combustion for energy could have on their economy. Realising that it would bring negative effects both economically and socially, as millions of people would be fired without the job skillset to move to a different industry, Saudi Arabia developed their Vision 2030[9], a plan to diversify their economy. Their plan is essentially built around creating new revenue streams away from the oil and gas industry. Fiscally, they plan to expand their Public Investment Fund (PIF), which is among the world's largest sovereign wealth funds, with assets totalling to 430 billion dollars.[10] Strengthening their fund is very important, because they desperately need another revenue stream to support their public expenditures. Economically, Saudi Arabia plans to develop sectors such as entertainment and tourism. Developing these sectors is essential in order to reach sustainability post-oil, as it creates new jobs and strengthens the economy. Socially, they plan to develop their education in order to better prepare their citizens for the "jobs of the future," and to increase the number of

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7 https://www.forbes.com/sites/rrapier/2019/02/14/how-much-oil-does-saudi-arabia-have/?sh=408e0dfd7b33

8 https://www.ispionline.it/it/pubblicazione/saudi-arabias-oil-dependence-challenges-ahead-14997
https://oec.world/en/profile/country/sau

9 https://www.vision2030.gov.sa/v2030/overview/

10 https://www.swfinstitute.org/profile/598cdaa60124e9fd2d05bc3b

women in the workforce in addition to employment numbers overall. As an example, they have started universities, such as the King Abdullah University of Science and Technology. This is extremely important and beneficial for the country, as it not only educates the newer generations and stimulates technology innovation and growth, but also shows that Saudi Arabia is actively working toward developing their country's skillset. This is especially important, as currently, the people employed by the oil and gas industry only have skills to work in that specific sector, so when millions of jobs will be eliminated, these people will have nowhere to go.

Policy Recommendations for the Saudi Government

Overall, the plan Vision 2030 has been working, and has made important progress in diversifying and building up their economy. They have scaled up their PIF from 150 billion dollars in 2015 to over 430 billion dollars currently. They aim to more than double this in the next 5 years to over one trillion dollars, which should be more than specific for public investment. They should invest with a certain level of caution, and not take on much risk. Additionally, I would recommend that they focus a lot of capital in developing the private sector. Currently, the private sector only accounts for 48 percent of GDP, and developing this more and allowing more jobs to flow from the government into the private sector would be beneficial.[11] It would promote rapid development, which would lead to more wealth and innovation. The Saudi government should try to provide subsidies to startups, especially in the energy and entertainment sectors, and also attract foreign investment by providing incentives, whether it be tax-based or otherwise, to investors.

Socially, I think that Saudi Arabia should continue their efforts to develop a more tourist-friendly environment. They have been loosening restrictions on women's rights, which makes it a more attractive tourist destination, and also utilises half of the population in the workforce. Additionally, in 2018, the Council of Foreign Relations studied women's equality in the workplace, and Saudi Arabia was among the world's lowest 10 in the rankings, placing 179th out of the 189 countries studied. This obviously suggests that Saudi Arabia still has a lot of work to do in regards to women's rights. It is imperative that the Saudi government continues to loosen

[11] https://www.saudiembassy.net/economy-global-trade

restrictions on women in order to make it more equal to properly utilise the women in the workforce. In addition to making it a better, more equitable society, it will boost their economic productivity.

Additionally, income taxes should also be used to boost fiscal revenue. Currently, Saudi Arabia does not have income taxes, and this robs them of 1.66 trillion dollars in taxable income. This would go a long way towards diversifying the fiscal revenue stream. As mentioned earlier, 90 percent of their fiscal revenue comes from oil exports, and by implementing an income tax, they can reduce this number significantly. Also, it gives them more money to redistribute how they see fit. They could use the new money to provide subsidies to start ups, especially in the energy sector, in order to develop their private sector and diversify their employment away from the oil and gas industry. Developing their private sector and moving away from oil dependency will definitely be a capital intensive few years, and by implementing income taxes, they will be able to shoulder the burden a lot better.

Overall, Saudi Arabia has not put themselves in the best position in terms of diversifying their economy away from oil. This is an example of the oil curse, as throughout their history, they have believed that they can survive solely off of oil, and did not take the necessary steps until very recently. This means that they are currently pressed for time as the world moves away from their products, so they have to accelerate their diversification process. If they cannot do so in time, it will lead to negative consequences, socially and economically, which is why it is so imperative that they take these steps for diversification.

Norway Case Study: Diversified Oil Exporter

Norway is also one of the world's most prominent fossil fuel exporters, but in comparison to Saudi Arabia is much more diversified and not as heavily reliant on fossil fuels. As a result, they are better positioned to adapt to the post-oil world. They are more democratic, allowing their decisions to accurately reflect their society's interests. Furthermore, education rates are higher, which allows for a more manageable transition for their workforce. However, Saudi Arabia is the exact opposite. They train the majority of their workforce to work in the oil and

natural gas industry and are a monarchy. Hence, the decision-making does not correspond to the people's interests, making it very difficult to transition.

Norway has been one of the first countries to start taking measures to combat climate change. It is almost entirely renewable dependent in terms of energy and, as a result, export nearly ten times the amount that they consume. They utilise environmentally clean hydropower plants to generate over 99 percent of their energy and have taken an anti-petrol and diesel car stance. They aim to ban the sale of such cars by 2025 and are already making satisfactory progress toward it. Battery-powered vehicles made up just under 80 percent of automobile sales in September 2021.[12] They have done this by creating incentives for EV users, such as tax exemptions for vehicles, toll exemptions, letting EVs on bus lanes, to name a few. These are only a few of the many steps that have made Norway a force combating climate change.

However, even with its pro-green stance, Norway is still economically dependent on fossil fuels. Its 5.14 billion barrels in proven oil reserves rank 22nd in the world[13], accounting for 3 percent of all oil exports.[14] Its natural gas also comprises a significant portion of the world's economy, accounting for 7.7 percent of exports, making Norway the third largest petroleum gas exporter. For Norway, the export of oil and natural gas creates a solid foundation for wealth and job creation; no country would want to pass up that opportunity. Crude oil and natural gas make up significant amounts of their economic statistics, such as 48 percent of exports, 14 percent of GDP and fiscal revenue, and 7 percent of employment. While these are large numbers, they are nowhere near as large as Saudi Arabia's, showing the difference in position the two countries are in, and why Norway will have an easier transition.

Norway also has the largest Sovereign Wealth Fund, with an AUM of over 1.3 trillion dollars in assets. This is extremely important to have, as it provides them with more and more security in the case of an oil crash. Their mission with this is to essentially manage all of their revenues from oil to benefit their current and future generations.[15] They own stakes in over 9100

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[12] https://www.reuters.com/business/autos-transportation/tesla-pushes-norways-ev-sales-new-record-2021-10-01/

[13] https://www.worldometers.info/oil/norway-oil/

[14] https://oec.world/en/profile/hs92/crude-petroleum

[15] https://www.nbim.no/en/

companies, none of which are deemed to be unethical companies. They restrict some companies, even if they can offer better returns, due to Norway's belief that they create negative externalities. This clearly shows that the government of Norway takes a lot of pride in making sustainable investments, and this is beneficial to their goals of sustainable development. Norway is a more socialist economy in the sense that there is a lot more government intervention in their industries. This is favourable, as since we can see that they have a vested interest in ensuring sustainability, their government will take necessary steps to make the private sector more sustainable.

They have already started to do so, developing industries that revolve around water and the sea, their main competitive advantage. This includes things such as hydropower, the seafood industry, and the maritime industry.[16] As aforementioned, hydropower accounts for the vast majority of Norway's energy usage, which means that they are not as oil dependent as the numbers suggest. They are only dependent on it due to the value that it provides for the exports, and in the sense of their own energy generation. This makes the transfer much less complicated compared to countries such as Saudi Arabia, who generate 99.5 percent of their electricity solely from fossil fuels.[17] There are currently 1681 hydropower plants in Norway, with a total capacity of 33055 megawatts, showing that in addition to producing energy, it provides Norway with jobs in a growing sector.

Norway's seafood industry is also an important part of their economy. This fishing industry has been a chief part in creating value and job opportunities in coastal cities. They are the second largest exporter of fish, with export value reaching NOK 94.5 billion in 2017 amounting to 8 percent of export revenue. This is already a large industry for Norway, but it has the potential to grow even more. The farming of Atlantic salmon is projected to multiply five times by 2050, creating even more value and more importantly jobs for Norway. This industry is also government regulated by a separate Ministry of Fisheries, which provides them with more fiscal revenue from exports. It also ensures that the government will try to make it as sustainable as possible long term. Another geographical competitive advantage about Norway is that they

[16] https://partner.sciencenorway.no/bi-business-forskningno/preparing-for-a-post-oil-era/1453351
[17] https://www.crystolenergy.com/media_posts/saudi-arabia-set-to-burn-record-amounts-of-crude-oil-for-power-generation/

have a significant amount of fishing area. They are situated on the edge of the Scandinavian peninsula, which provides them access to fishing areas in three directions. Combining this with the number of islands that they possess, it amounts to the 17th largest fishing area in the world.

Norway also controls the 4th largest merchant fleet by value, which brings other opportunities for value and job creation in the country.[18] Oftentimes, the fleets operate in tough weather conditions, they have been forced to develop technology and solutions that mitigate these risks. The development of these technologies is going to be essential in protecting their industry from market fluctuations, and has potential to create new opportunities for innovation and growth. Additionally, the development of these technologies is making Norway's shipping industry much more efficient, and has established themselves as a world leader in this sector. Utilising competitive advantages such as these will enable them to further accelerate growth and dominate a larger portion of the market.

Policy Recommendations for the Norwegian Government

Overall, Norway has put itself in a great position to combat the risks of having a fossil fuel dependent economy when the world is actively moving towards sustainability. They have developed and continued to develop their renewable energy as well as maritime sectors in order to provide diversification. Additionally, their Sovereign Wealth Fund was an integral part of their diversification, funnelling fossil fuel money into sustainable investments. Norway did a great job of recognising early on that they would not be able to survive solely off of fossil fuels, and has built up their fund to be worth 1.1 trillion USD, the highest AUM out of all sovereign wealth funds. Norway is able to use 3 percent of this annually for public expenditures, providing fiscal security.

Norway's situation has put them ahead when it comes to diversification. Because they were able to recognise and implement plans to hedge against idiosyncratic fossil fuel related risk means that currently, as other fossil fuel dependent countries struggle to diversify their economies in time, Norway does not have to worry about it as much. This also means that the other countries, who are in similar positions to Norway a few decades back, should attempt to

[18] https://www.trade.gov/country-commercial-guides/norway-shipping-maritime-equipment-services

recreate some of the solutions that Norway had. Countries like Saudi Arabia and the UAE have already started to develop their Sovereign Wealth Funds, at 430 billion and 579 billion dollars respectively. While this is not nearly as big as Norway's 1.1 trillion, it is a solid amount for the protection of their citizens and future expenditures if necessary.

Additionally, the main reason why Norway has had an easier time transitioning is due to the fact that they do not rely on fossil fuels for energy generation. As mentioned prior, 99 percent of their energy comes from hydropower, while countries like Saudi Arabia are heavily reliant on fossil fuels for energy. Saudi Arabia and similar Middle Eastern countries need to make use of solar power, their competitive advantage, for energy generation. Not only does this provide diversification to their energy supply, it also creates more job opportunities in a growing industry, which is why it is imperative for Middle Eastern countries to develop this sector.

Moreover, Norway has little to no government corruption, and is very democratic. Their corruption ranking is number 7 according to the Corruption Perception Index, compared to Saudi Arabia's authoritarian government at 52nd.[19] Combining this with the fact that the Saudi government manages the oil in the country makes it much harder to diversify, as they are incentivised to continue with a fossil fuel based economic model. It is imperative that governments such as Saudi's become more democratic, so that their economic decisions are tailored to the needs of the society, not solely the government, something that the Norway government has done well in decades prior.

Bolivia Case Study: Potential Beneficiary of Renewables

Unlike Saudi Arabia and Norway, Bolivia is not on the wrong side of the energy transition, but rather, has potential to benefit from it. The country is not an exporter of fossil fuels, but still is challenged with diversification of their economy to thrive and sustain themselves in a post-fossil fuel world. Instead of diversifying away from fossil fuels, they are tasked with diversifying towards renewable energy. Bolivia's potential for wealth and job creation come in the form of lithium, a lightweight metal with the least density and high electrochemical potential. As a result of these properties, the element has become a key

[19] https://www.transparency.org/en/cpi/2020/index/nzl

component in the manufacture of rechargeable lithium-ion batteries. These rechargeable batteries provide a renewable, carbon neutral source of energy to things such as vehicles and electronics through sources such as solar and wind power, eliminating the need for fossil fuel based energy sources.

Undoubtedly, there will be a positive demand shock for lithium in the following decades, as the world will need lithium ion batteries to support renewable energy generation. Bolivia has the world's largest lithium supply; its reserves hold 21 million metric tonnes of the metal. The region in the Andes where lithium can be found at the intersection of Bolivia, Chile, and Argentina, known as the "Lithium Triangle," possesses more than two-thirds of the world's lithium supply.[20] However, unlike Argentina and Chile, Bolivia's lithium stores, located in the Salar de Uyuni, have not been capitalised on, largely due to the politics surrounding it and lack of technology that have not made their supply economical to produce.

The Bolivian government has not allowed a meaningful amount of lithium to be produced. Bolivia has been plagued with several revolutions and high corruption, ranking 124 on the corruption perception index. These challenges have led to several setbacks in regards to the production of lithium. Former president Evo Morales attempted to nationalise lithium during his term, but this led to many challenges, financially and technically, and did not lead to any progress in harnessing the element. Towards the end of Morales's presidency, he did start to form partnerships with foreign governments for lithium trade, and started to build a commercial lithium plant in 2018, but the plant has still not been finished. The current president of Bolivia, Luis Arce, has pledged to continue this progress, but the uncertainty and risk for foreign investors and countries still remain.

Arce has made it clear that he wants lithium to be the driver of economic prosperity for the Bolivian economy, stating that Bolivia should control 40 percent of the world's market by 2040, and it certainly has the potential to do so. The market for lithium is projected to double by 2027, and rising prices due to higher demand and global interests in environmentally clean energy would bring benefit to one of the world's poorest countries. However, this can only

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20 https://www.argusmedia.com/en/news/2247993-bolivia-shortlists-firms-for-lithium-pilot-production#:~:text=Bolivia%20has%20the%20world's%20largest,and%20energy%20Franklin%20Molina%20said.

happen if the government is able to make lithium economical to produce, provide jobs in this sector to its citizens, and manage the tax revenue from lithium to bring more benefit to their society. All of this amounts to a considerable amount of risk in this sector for foreign investors, as Bolivia currently does not have a viable solution to their problem of harnessing lithium. As a poor country with relatively little machinery to mine lithium, barely any infrastructure to transport it, and without the technology to process it, Bolivia simply cannot produce it as economically as other countries can. Additionally, another big challenge with Bolivian lithium is the chemical nature of it. The Uyuni's brines contain high levels of magnesium, making it hard to separate with lithium. Combining these challenges with an unstable political environment, it seems as though Bolivia will not be able to capitalise on the metal.

Additionally, there are risks associated with the demand of lithium itself. Battery technology is constantly changing, and other elements and advances in battery production could threaten to upend the lithium market, posing yet another risk for Bolivian lithium production. As a result, foreign investment into this sector would be limited, but the government should continue to attempt to harness and take advantage of their vast lithium stores, as it provides them with a possible way out of poverty.

Policy Recommendations for the Bolivian Government

The largest problem that Bolivia has had in regards to lithium production has been the government plan around it. Ex-President Morales very strongly believed that the state should have the majority of the power in lithium production, laying out a state owned project to capitalise on it, starting with the expansion of their state-operated lithium production company YLB (Yacimientos del Litio Boliviano). However, this project was plagued with technological, financial, and political setbacks, and as a result, has accomplished very little.

This brings up the question of whether or not it is worth it to denationalise Bolivian lithium. There is a very strong argument that putting lithium production in the private sector would drive up production through profit incentives, and as a result would lead to more growth in this industry. However, even under current president Arce, Bolivia has made it clear that they

want to keep lithium production in state hands, but are open to partnering with other, private firms.

If Bolivia wants to fully reach the potential that its lithium holds, they first need to form foreign partnerships with firms that have the technology and resources to produce lithium. They have already started to do so, as in the tail-end of the Morales presidency, Bolivia commenced a partnership with a German firm named ACI Systems, who claimed to possess the technology necessary to extract large quantities of lithium. However, this venture was not popular within Bolivia, and received harsh criticism for not being beneficial enough to the Bolivians themselves, and the deal was cancelled.

While the deal did not bring any benefit, it is certainly a step in the right direction. Bolivia has to become more open to similar foreign partnerships for extraction and exportation of lithium, as it provides them with security in this industry. Foreign partnerships would make the lithium industry less susceptible to political and financial risks, as with them, the Bolivian government would not have total control over production. Current president Arce has mentioned that he intends to stimulate foreign investment and partnerships. However, Arce has to ensure that these deals will be in the interest of the Bolivian society, and not solely in the interest of the foreign firms.

Secondly, Bolivia needs to simply make their lithium economical to produce. Currently, there are several obstacles that stand in the way of this goal, such as limited technology and infrastructure to produce lithium. As aforementioned, partnerships with foreign firms can solve the first issue of technology, but Bolivia also must invest in providing infrastructure and subsidies. They need to do this in order to become competitive with Chilean and Argentinian lithium. Chile and Argentina have much less lithium than Bolivia, but also considerably less risk, as they have stable political environments as well as infrastructure to produce economically.

Overall, while Bolivia has the potential to become a world leader in the lithium industry, political, economical, and production obstacles have made it challenging to profit from it. They currently have considerable competition in their neighbouring countries, and if they want to fully utilise their resources, they need to make the production of them economically viable by

partnering with foreign firms, and by advancing technology and infrastructure in their own country.

Conclusion

This paper was intended to analyse the economic impacts on resource-wealthy countries as a result of the world's transition to renewable energy. Three separate countries, each in different situations in regards to their resources, were analysed. These countries were Saudi Arabia, Norway, and Bolivia. Saudi Arabia was chosen to be analysed due to its position as a global leader in fossil fuel production, with its economy heavily dependent on the exportation of it. Norway was once in a similar position to Saudi Arabia, but has taken steps to diversify its economy away from fossil fuels over the past few decades, and has established itself as a leader in the renewable energy sector, and has dedicated itself to combat climate change. Bolivia is the one country that stands to benefit from an energy transition, as they possess the world's largest supply of lithium. However, they have not been able to capitalise on their vast stores.

The main takeaways from this research paper are as follows: countries in a similar situation to Saudi Arabia must focus on diversification of their economies, countries such as Norway must continue to diversify and provide opportunities in industries outside of fossil fuels, and countries such as Bolivia must attempt to spur technological advancements in order to profit on their natural resources.

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