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The Arbitration Review of the Americas

2024

Current issues impacting renewable energy construction disputes in the Americas

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Current issues impacting renewable energy construction disputes in the Americas

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Summary

IN SUMMARY

The surge in global energy demand has prompted investments in renewable energy projects in the Americas. However, these projects face challenges such as complex financial arrangements and contracting that require stakeholders to be aware to avoid severe consequences and disputes. International arbitration emerges as a solution to resolve renewable energy construction disputes by involving specialised arbitral tribunals. To ensure successful implementation, the construction industry must adapt to renewable energy's changing landscape, customising roles and risk allocation. Global procurement and supply chain dynamics must also be managed to minimise disruptions. Proactive addressing of issues will promote the sustainable energy transition and facilitate the deployment of clean energy projects.

DISCUSSION POINTS

- The global surge in demand for renewable energy
- Unique challenges of renewable energy projects in the Americas
- Contractual disputes and complex financial arrangements
- Global procurement strategies and complexities

REFERENCED IN THIS ARTICLE

- Build Back Better Act
- Inflation Reduction Act
- *International Labour Organization Convention No. 169*

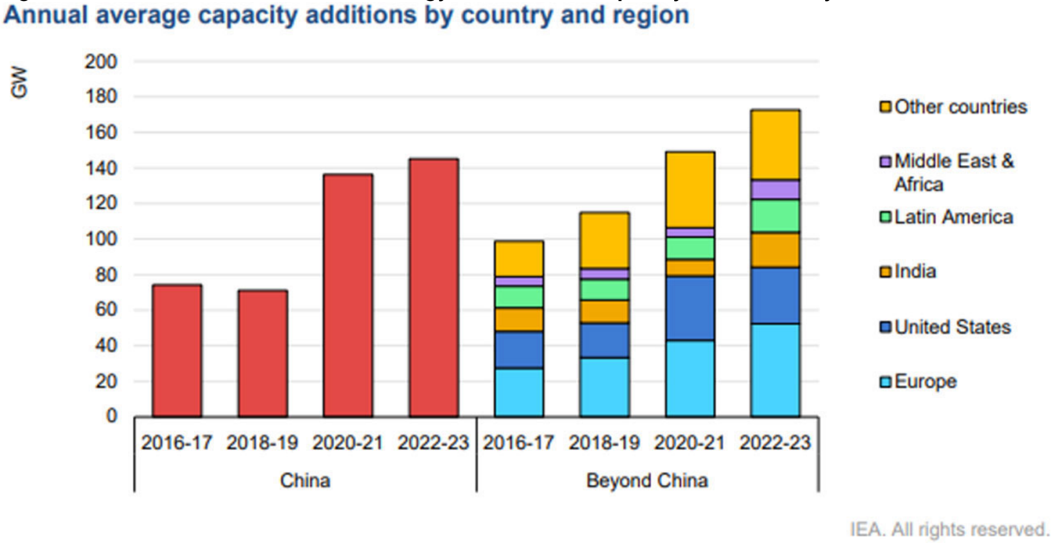
INTRODUCTION

The global surge in demand for energy has created a pressing need for rapid financing and construction mechanisms to keep pace. As nations worldwide strive to combat climate change and transition towards sustainable energy sources, renewable energy projects have gained significant momentum. This surging global energy demand is being addressed in the Americas through deliberate investments in renewable energy production facilities. As these projects harness rapidly advancing technologies and bring forth their own set of challenges, including complex financial arrangements, intricate contracting mechanisms and the need for global procurement coordination strategies, it is crucial for all stakeholders to heighten their awareness of the potential pitfalls and disruptions that can have severe consequences and lead to disputes. By understanding and proactively addressing these issues, the successful implementation of renewable energy projects can be ensured, furthering sustainable energy transition.

THE GLOBAL SURGE IN DEMAND FOR RENEWABLE ENERGY

The world at large is experiencing a boom in energy demands that places a premium on fast-paced financing and construction mechanisms. The International Energy Agency (IEA) publishes data on the global renewable annual average capacity additions by country and region. The data shows that China has led the world in recent years as it accounts for 45 per cent of global renewable energy additions.

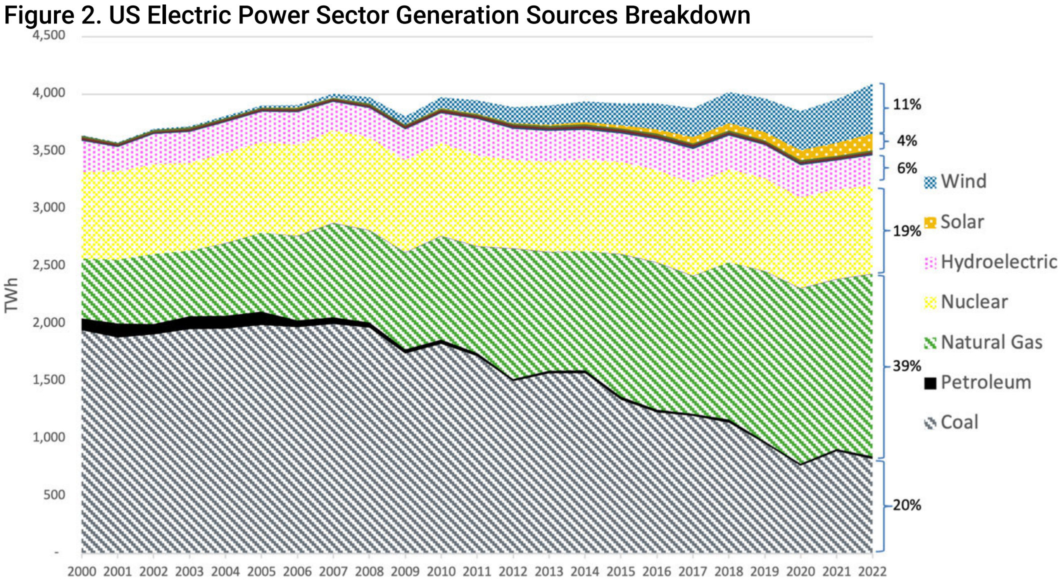
Figure 1. IEA Data On Renewable Energy Production Capacity Increases By Years



Sources: Renewable Energy Market Update Outlook for 2022 and 2023, International Energy Agency, May 2022.

In addition to this, renewable energy projects are gaining significant momentum worldwide as nations strive to combat climate change and transition towards sustainable energy sources. In the United States alone, data from the US Energy Information Administration (EIA), published in June 2023, gives rise to the changing picture of energy production in North America.

Figure 2. US Electric Power Sector Generation Sources Breakdown



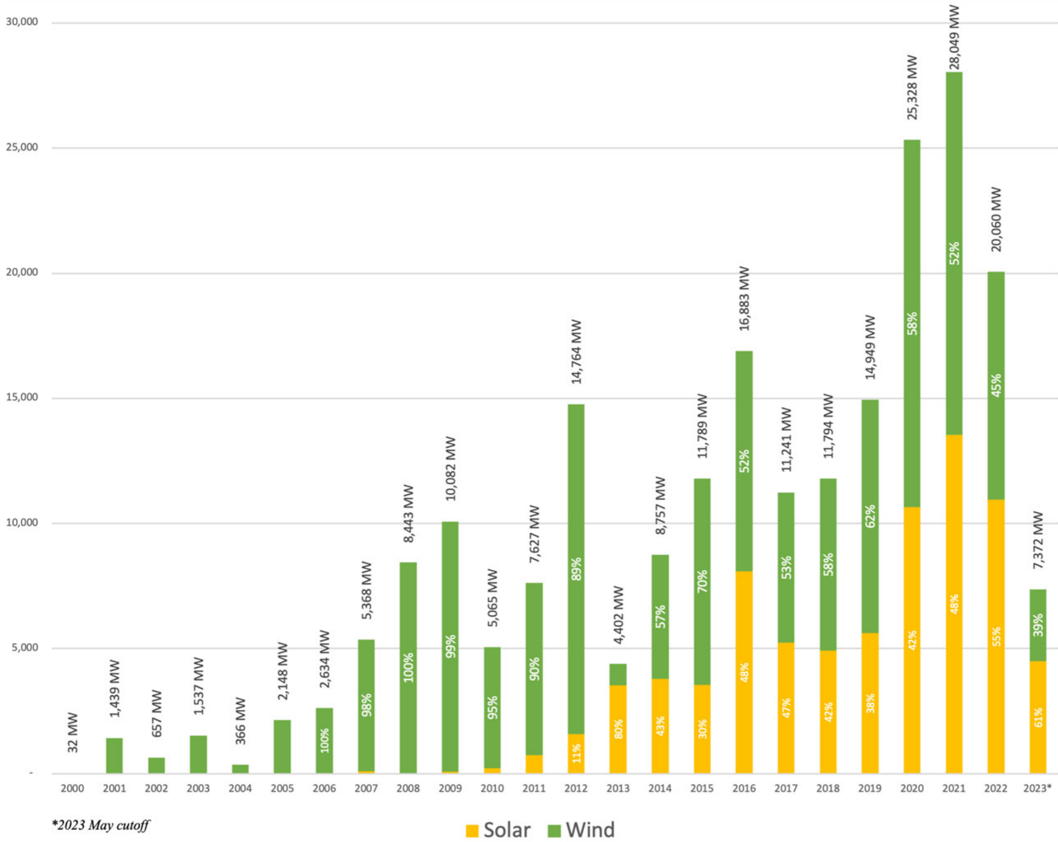
Sources: Monthly Energy Review, U.S. Energy Information Administration, June 2023, Table 7.2b [https://www.eia.gov/ totalenergy/data/browser/?tbl=T07.02B](https://www.eia.gov/totalenergy/data/browser/?tbl=T07.02B).

This data from the EIA, released in June 2023, paints a transformative picture of energy production in North America. Over the past two decades, US electricity generation has steadily grown by approximately 20TWh per year. Simultaneously, the contribution of coal to the energy mix declined from around 53 per cent in 2000 to as low as 20 per cent in 2022, demonstrating a remarkable 33 per cent decrease in reliance on coal.

This decline in coal dependence was accompanied by a 25 per cent increase in reliance on natural gas, further driving the transition towards cleaner energy sources. Notably, wind and solar energy have experienced a significant boost, with their contribution to US electricity consumption rising from less than 1 per cent in 2000 to over 13 per cent in 2022. This shift can be attributed to increased investments in the renewable energy sector, supported by political movements and government tax incentives, such as the Build Back Better Act and the Inflation Reduction Act.

Nameplate capacity in the United States represents the theoretical output of a power source that is registered with governing authorities and brought online. The years 2020 and 2021 were banner years for nameplate capacity with a combined total of more than 53GW of wind and solar energy being constructed and placed into operation.

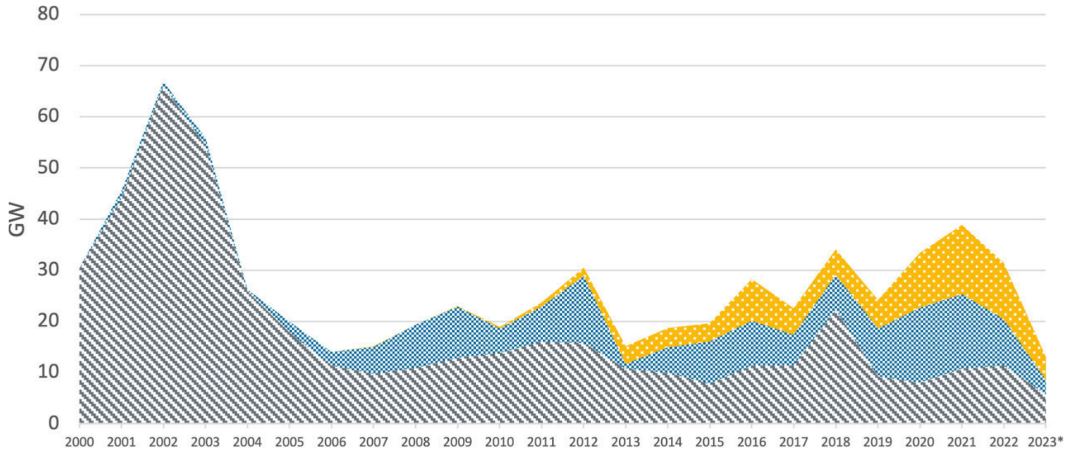
Figure 3. Yearly Nameplate Capacity Additions Of Wind And Solar Plants (greater Than 1MW) That Are Still Operational



Sources: Preliminary Monthly Electric Generator Inventory (based on Form EIA-860M as a supplement to Form EIA-860), U.S. Energy Information Administration, May 2023, https://www.eia.gov/electricity/data/eia860m/.

When comparing the output of electric power facilities brought online in the past 23 years, it is clear that wind and solar production facilities are beginning to dominate the landscape of investment and construction compared to other forms of energy production.

Figure 4. Yearly Output Based On Nameplate Capacity For Facilities Being Placed Into Operation Each Year

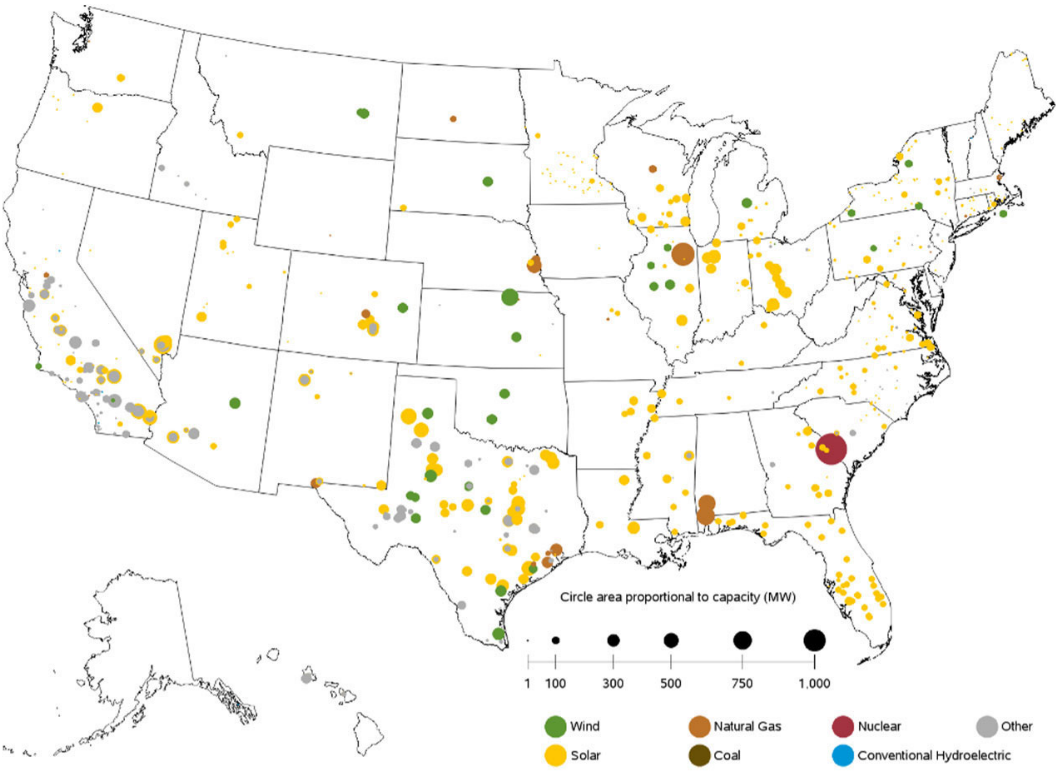


wind and solar

Sources: Preliminary Monthly Electric Generator Inventory (based on Form EIA-860M as a supplement to Form EIA-860), U.S. Energy Information Administration, May 2023, https://www.eia.gov/electricity/data/eia860m/.

This trend is only expected to increase as we look forward to the next two years of nameplate capacity energy production in the United States. Data from the EIA graphically demonstrates the magnitude of development and sheer number of projects that are intended to be commissioned in the United States alone over the next year.

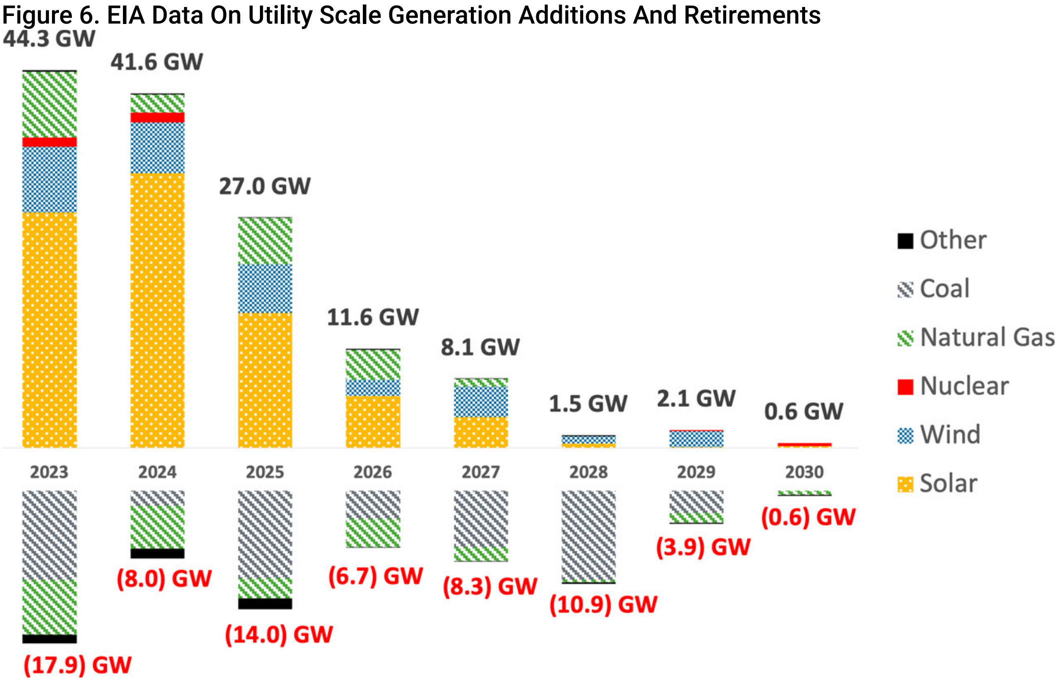
Figure 5. Graphic Demonstration Of Utility-scale Generation Units Planned To Come Online From May 2023 To April 2024



Source: US Energy Information Administration Form EIA-860

Simultaneously, there is a corresponding trend of planned retirement of fossil fuel generation facilities, as evidenced by data from the EIA. This data highlights that even natural gas facilities are starting to be surpassed by wind and solar production, which is strongly incentivised in the current energy landscape.

Figure 6. EIA Data On Utility Scale Generation Additions And Retirements



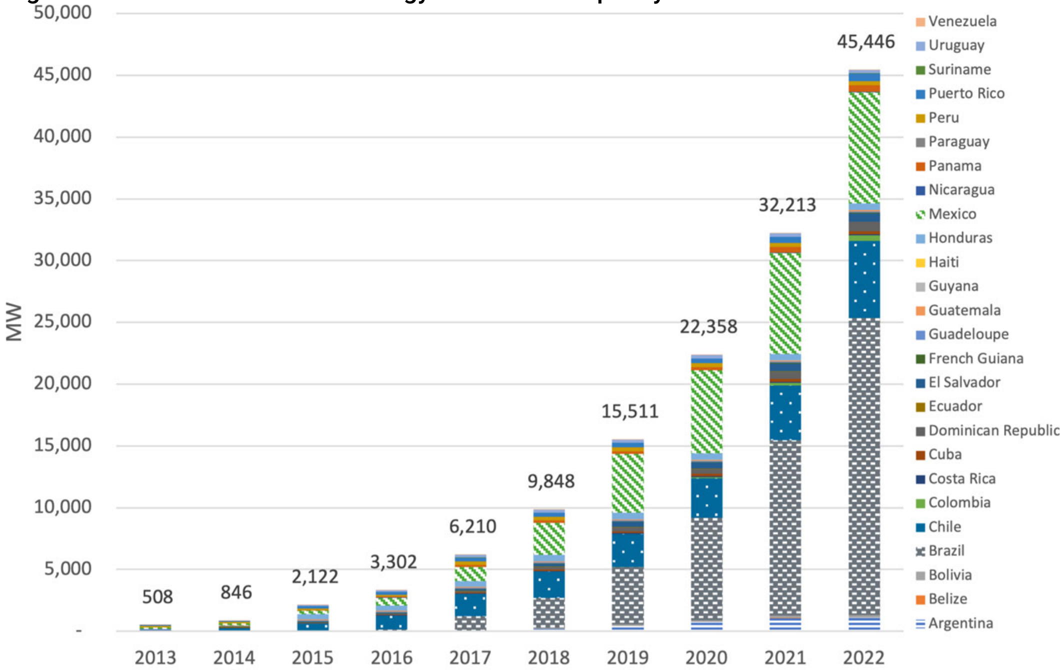
Source: Electric Power Monthly, U.S. Energy Information Administration, June 2023, Tables 6.3, 6.4, 6.5 and 6.6. https:// www.eia.gov/electricity/monthly/current_month/june2023.pdf.

In addition, there is a planned decommissioning and retirement of coal and even natural gas facilities that is placing wind and solar energy at the forefront of energy production. This progression is symptomatic of the sociopolitical pressures to turn to forms of clean energy that are renewable and the economic considerations of lowering the cost of production as the world's investment in research, development, manufacturing and incentives make these forms of energy production more viable in the long term.

The transformation in the construction landscape of energy production extends beyond the United States, encompassing the Latin America as well. Latin American countries have made significant advancements in their energy transition efforts. Notably, Uruguay surpasses the United States in the Energy Transition Index (ETI) published by the Economic Forum, with nearly 97 per cent of its electric power generated from renewable sources.[1] Several Latin American governments – Argentina, Brazil, Chile, Colombia, Ecuador, Peru and Uruguay – have established renewable energy goals and implemented various tax reforms to incentivise investors in the renewable energy sector.

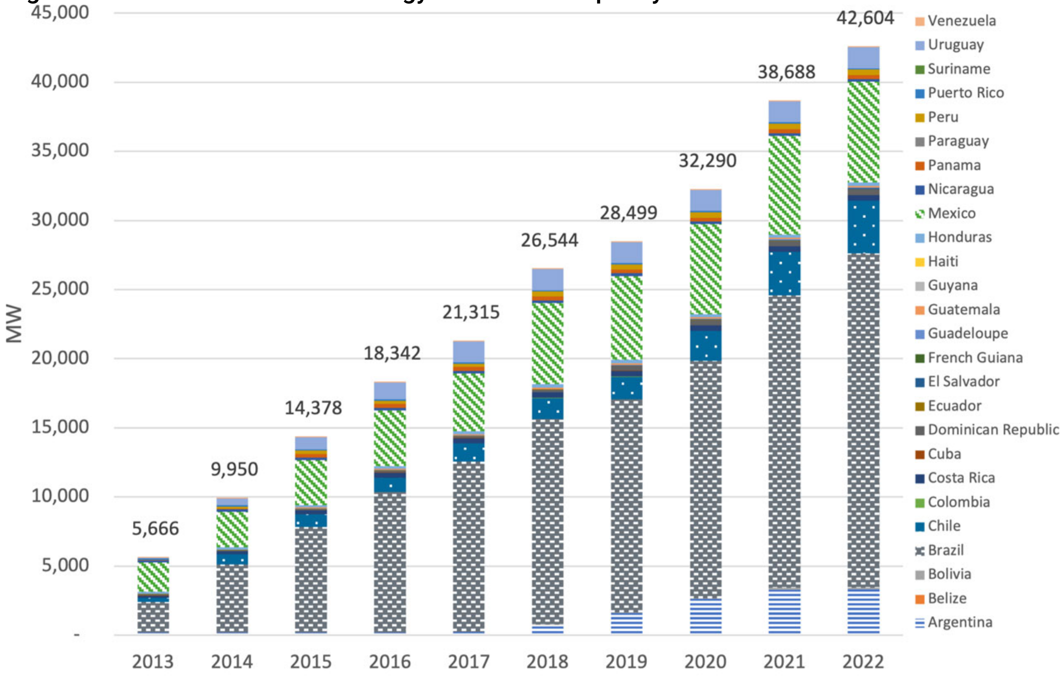
These proactive measures have yielded positive results, as evidenced by the significant growth of wind and solar farms in the region over the past decade. Brazil, endowed with vast natural resources, has emerged as a major player in this energy development space, closely followed by Mexico and Chile. The collective efforts of Latin American countries have propelled the development of renewable energy projects, contributing to the region's ongoing energy transition. This is best demonstrated by Renewable Capacity Statistics data provided by the International Renewable Energy Agency.

Figure 7: Latin American Solar Energy Production Capacity



Sources: Renewable Capacity Statistics, International Renewable Energy Agency (IRENA), 2023.

Figure 8. Latin American Wind Energy Production Capacity



Sources: Renewable Capacity Statistics, International Renewable Energy Agency (IRENA), 2023.

In summary, with world energy demands on the rise, this challenge is being met in the Americas with an intentionally driven investment in renewable energy production facilities. These projects are utilising rapidly evolving technologies and present their own unique challenges, contracting mechanisms, complex financial arrangements and global procurement coordination strategies. As a result, it is important that all parties become increasingly aware of the various pitfalls and disruptions that can have significant consequences and give rise to disputes.

UNIQUE CHALLENGES OF RENEWABLE ENERGY PROJECTS IN THE AMERICAS

As with any capital project, the construction of new renewable energy developments often requires acquiring new land. Given that land is a limited resource, encroachment on indigenous territories becomes nearly inevitable. In certain cases, these projects are welcomed by communities seeking economic benefits, job training opportunities and new investments in impoverished areas. Resistance may arise in other instances, however, as native labour forces and nationalistic sentiments oppose perceived foreign interference and investment.

Renewable energy projects frequently involve land acquisition and interactions with indigenous communities or local populations. Disputes may emerge concerning land rights, consultation processes, cultural heritage and archeological preservation, and the equitable distribution of project benefits. Resolving these conflicts necessitates a nuanced understanding of language barriers, cultural sensitivities, historical context and legal frameworks that safeguard indigenous rights.

For example, hydroelectric projects require access to rivers that often serve significant agricultural needs for local communities. Solar projects demand land with uninhibited sunlight, which may coincide with fertile agricultural areas or hold important historical significance for native populations. Wind projects require regions with high wind speeds, which may also experience rainstorms and be favourable for local agriculture or industry.

At the same time, there are incentive programmes being created to encourage and facilitate investment in these same lands and communities. For example, in the United States, the Inflation Reduction Act includes incentives of up to 20 per cent investment tax credits for renewable energy projects on indigenous land, stimulating development in these regions.[2] Similarly, the Ecuadorian government has implemented tax incentives for renewable energy projects in non-urban areas of Quito and Guayaquil. Brazil has also introduced tax incentives for renewable energy projects in the northern and northeastern regions of the country.[3]

To protect indigenous populations, Latin American countries ratified International Labour Organization Convention No. 169,[4] requiring the participation and consultation of local indigenous groups on matters related to projects in their territory.[5] In short, development of land for the needs of increased energy demands must take into consideration sociopolitical constraints and respect for the native cultures and peoples as enforced by local regulations and laws, which represents a tricky landscape for foreign investment to navigate.

In the authors' experience, illustrative examples of respecting cultural and historical rights in renewable energy projects on indigenous lands can be seen in the mountains of Guatemala, where local personnel were invited to conduct their religious ceremonies during major groundbreaking events. In other cases, projects have scheduled seasonal work stoppages to allow for the uninterrupted harvest of local agriculture, free from construction traffic interference. When foreign contractors and investors factor in sensitivity to cultural identity and facilitate the integration of renewable energy sources within local populations in their construction schedules, it leads to long-term benefits for both the projects and the communities, at minimal cost.

When these issues cannot be resolved, international arbitration can play a crucial role in providing a neutral forum through which parties can present their arguments and concerns. Arbitrators can carefully consider relevant legal and cultural aspects to ensure a fair and equitable resolution that respects the rights and interests of indigenous communities and local stakeholders. In addition, by selecting knowledgeable arbitrators who can understand linguistic, cultural and historical issues, parties can be assured of a knowledgeable trier of fact that can be fully attuned to the issues in dispute and the specific jurisdictions under which these disputes are heard.

CONTRACTUAL DISPUTES AND COMPLEX FINANCIAL ARRANGEMENTS

Contracts play a crucial role in governing renewable energy construction projects. Disputes may arise concerning project specifications, payment terms, change orders, and warranties and liability for unforeseen events, such as force majeure occurrences. Force majeure events, including natural disasters, pandemics and political unrest, can disrupt project timelines and raise issues of contractual performance and allocation of risks.

These contracts take a wide variety of forms, from standard lump sum or guaranteed fixed price to concession agreements to build, own, operate and transfer contracts. Disputes in Latin America often balance civil or common law perspectives with the economic-financial equilibrium that makes them viable. International arbitration provides a flexible mechanism to address these unique contractual disputes by allowing parties to present their interpretations of tender expectations, contract provisions and the myriad of new considerations that must be taken into consideration to seek fair resolutions in an ever-changing construction contract landscape.

Many of the pressures of the evolving contract mechanisms are driven by the variety of unique financial mechanisms and pressures that are brought to bear in developing countries. For example, for any capital project investment, private investors will typically only invest their funds (or funds they manage) if the project promises energy generation, and its resultant revenue, in an economically viable and expeditious time frame. Prior to the due diligence phase for any project, the estimated capital requirement (cash investment required) and development period (number of years before facility's operation) are pegged against the risk-adjusted positive cash flows produced by the asset in the future, accounting for the time value of money. As time is a component of the calculation, the commercial operational date (COD) of any renewable energy project is a pivotal date in the financial viability of any project.

To limit the idiosyncratic risks associated with the power markets, developers typically engage customers or off takers in the development phases and enter into power purchase agreements (PPAs) with the consumers, guaranteeing the supply of power on a certain date (after COD) in the future at a certain price for a certain period of time. Developers then utilise these PPAs to demonstrate the guaranteed returns of the project to the financial institutions to secure funding for projects. As with any guarantee, they are often met with penalties if they are not achieved.

Furthermore, developers also utilise the COD in their agreements with the independent grid operators' readiness to accept power from the facility and connect the plant to the power grid to supply the consumer.

Therefore, the COD of these renewable facilities plays a pivotal role in the financial viability of the project, the power obligations to their PPA off takers and the readiness of the grid to accept power from the facility. It is incumbent on developers to ensure that the development of these projects is on track. As such, developers tend to construct contracts with a variety of milestones signifying the completion of major phases of the project to make sure that the project is on track to be completed on time and the COD date is achieved as planned and advertised to all stakeholders.

Developers typically pass on some of these risks to the entities involved in the engineering, procurement and construction (EPC) of these facilities via complex escalating liquidated damages mechanisms, which can either be delay- or performance-related. These liquidated damages are typically predetermined at the time of the execution of the contract between the different parties based on various formulations of expected loss of revenue or prolongation costs. These liquidated damages clauses set a fixed currency amount for each day of delay, or a certain performance metric related to the output or the reliability of the facility.

These formulations are not always the result of complex analysis, however, and can lead to acrimonious disputes over whether they represent a real damage to the end user or operator of the facility or a windfall profit, or penalty, which can have legal and equity consequences that range beyond the content of this article.

To exert an added element of control over the cost- or revenue-generating capabilities of their projects, many owners are also infusing their own deliverables into the construction contracts via owner-procured equipment such as solar modules, inverters, turbines and wind turbine generator components. When the owner manages critical components, such as the wind turbines, solar modules and inverters, it presents a new interface and challenge to the contractor who now has reduced control over the critical path of the project when there are delays and disruptions. As the civil works, engineering and procurement, and installation of all the facility components are typically handled by the balance of plant (BOP) contractor, this leads to complex disputes over whether owner-procurement drove critical path activities or the contractor's performance.[6]

The owner's involvement in the project's pivotal engineering and procurement phases places the owner in a more active rather than the typical passive role in the construction phase's success. The BOP contractor would not be able to install the electromechanical components of the project until the owner satisfies their obligation to deliver the components on time per the agreed upon contractual dates.

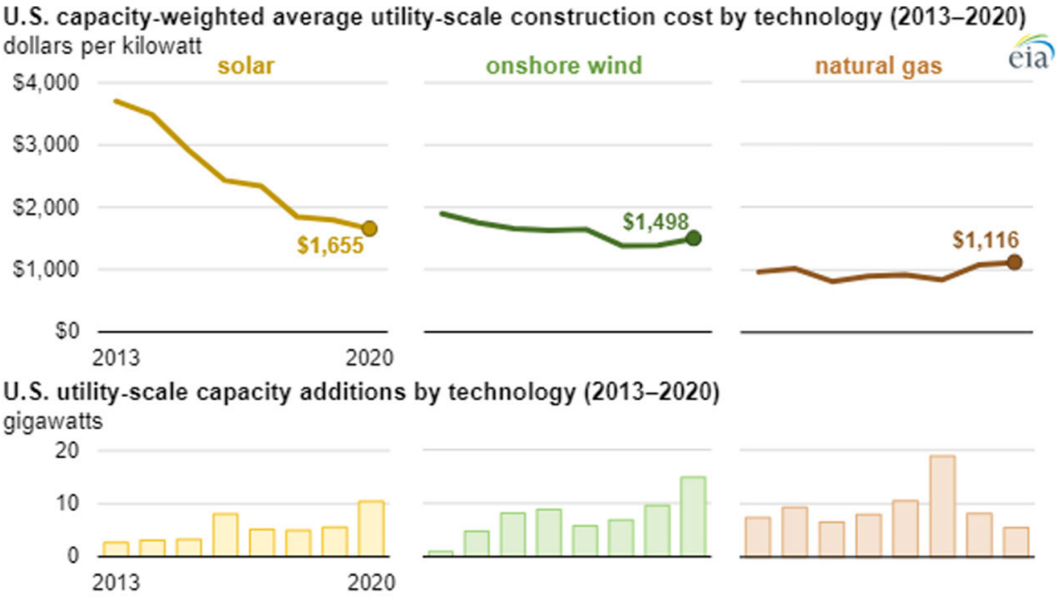
At the same time, in the authors' experience, there is a noticeable incentive for the local governing utilities and authorities to take advantage of the infusion of foreign investment and construction to demand that owners and operators bring the existing infrastructure up to date as a requirement before they agree to accept the produced energy into their transmission lines for sale on the market. This reality can lead to delays in the COD date and creates a likelihood for disputes as the contractors constructing the facilities and the owners of these facilities often disagree over who should bear the contractual risk of these local governing authority demands.

Another element of risk that is injected into this contractual and financial landscape creates a potential for disputes related to the ever-evolving technologies that form the major elements of the energy production units. This leads to complex global engineering and procurement challenges that are being met in a variety of ways and that lead to an even greater variety of disputes as what works on paper does not always work in practice.

GLOBAL PROCUREMENT STRATEGIES AND COMPLEXITIES

The evolution of technology and manufacturing capabilities have led to significant benefits and complexities in global procurement. For example, advancements in solar technologies have driven down the cost of energy production in clean renewable energy development. Specifically, solar farm construction has seen the greatest reduction in utility scale construction cost per kilowatt out of the two major renewable energy sources (solar and wind) with an overall decrease of 8 per cent in 2020 to US$1,655 per kilowatt.

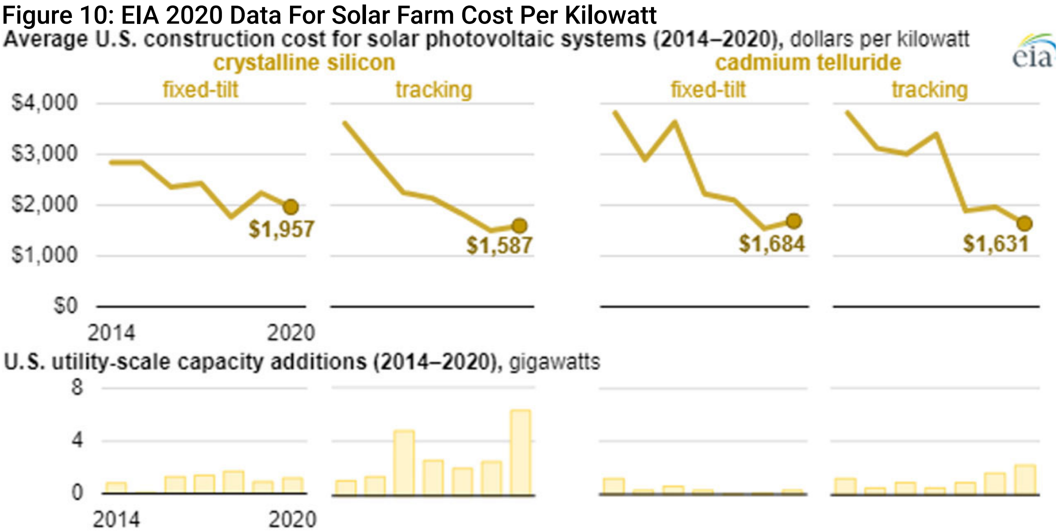
Figure 9. EIA 2020 Data For Solar, Wind And Natural Gas Construction Cost Per Kilowatt



Source: Average U.S. construction costs drop for solar, rise for wind and natural gas generators, EIA, November 03, 2020, https://www.eia.gov/todayinenergy/detail.php?id=54519.

The two major types of photovoltaic solar panel systems used are crystalline silicon[7] panels and cadmium telluride panels.[8] The fixed tilt solar panel farms cost per kilowatt was higher than the tracking solar panels in 2020.[9] Even though the tracking solar panel systems cost more than the fixed tilt solar panel system, the constant adjustment of the tracking panels result in a greater electricity production, which on average reduces the overall cost per kilowatt of the facility.

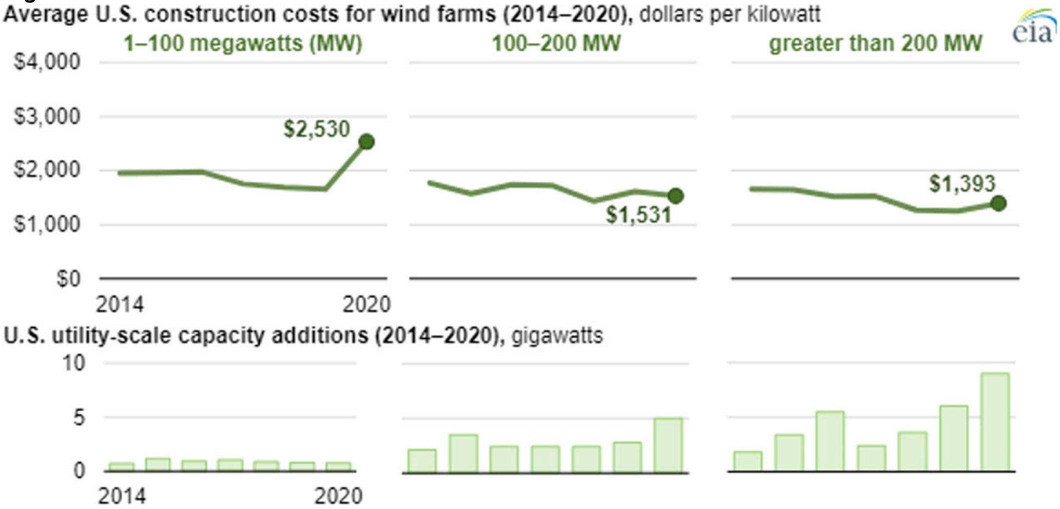
Figure 10: EIA 2020 Data For Solar Farm Cost Per Kilowatt



Source: Average U.S. construction costs drop for solar, rise for wind and natural gas generators, EIA, November 03, 2020, https://www.eia.gov/todayinenergy/detail.php?id=54519.

Similar to solar, the wind industry also experienced a reduction in the cost per kilowatt for the 100-to-200-megawatt wind farms in 2020. The industry experienced a steep incline, however, in the cost per kilowatt for the 1MW-to-100MW wind farms and a slight incline in the cost per kilowatt for wind farms greater than 200MW in 2020.

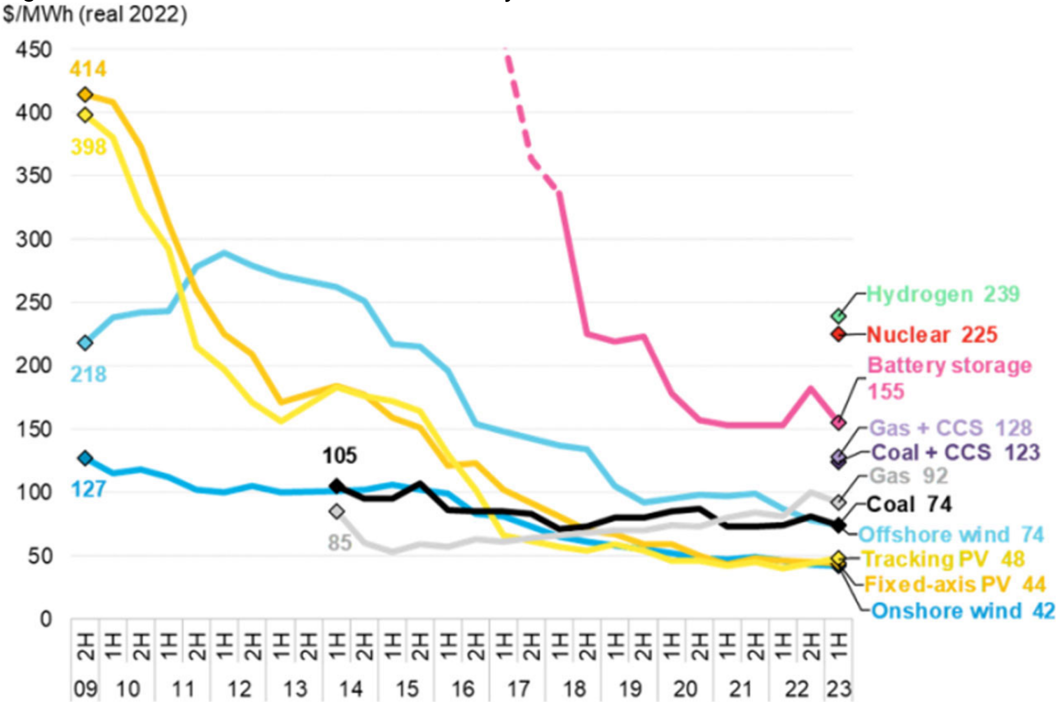
Figure 11. EIA 2020 Data For Wind Farm Cost Per Kilowatt



Source: Average U.S. construction costs drop for solar, rise for wind and natural gas generators, EIA, November 03, 2020, [*https://www.eia.gov/todayinenergy/detail.php?id=54519*](https://www.eia.gov/todayinenergy/detail.php?id=54519).

While the construction cost per kilowatt produced serves as an interesting metric to gauge progress in the renewable energy industry, a more comprehensive metric that investors often focus on is the levelised cost of electricity (LCOE). LCOE calculates the lifetime costs,[10] divided by the total energy produced by the asset over the course of its lifetime.[11] LCOE is where the true strides are seen for the wind and solar industries, in 2018 the LCOE of onshore wind and solar farms was less than the LCOE of coal powered power plants and in the first half of 2023 the offshore wind farms are level with the LCOE of coal.[12]

Figure 12. Global Levelised Cost Of Electricity



Source: Cost of Clean Energy Technologies, Drop as Expensive Debt Offset by Cooling Commodity Prices, BloombergNEF, 7 June 2023, [*https://about.bnef.com/blog/cost-of-clean-energy-technologies-drop-as-expen sive-debt-offset-by-coolingcommodity- prices/*](https://about.bnef.com/blog/cost-of-clean-energy-technologies-drop-as-expensive-debt-offset-by-coolingcommodity-prices/).

These advancements highlight the significant progress made in technology, design, development, construction and operation of these energy projects.

These ever-evolving wind turbine generator components, solar inverters and modules, hydroelectric turbines and other major electrical components are subject to global trade and shipping demands that can be incredibly difficult to navigate. These demands introduce a whole realm of potential disputes, unanticipated conditions and contractual hurdles that continually push out commissioning and turnover dates at the cost of valuable revenue generation.

An example from the authors' recent history is when the covid-19 outbreak disrupted the manufacturing of wind turbine generator components that are already subject to compressed windows of fabrication and increased demand all while technologies are evolving and projects are demanding larger turbines with longer blades requiring increased engineering.

Owing to the need to achieve the COD as soon as possible and the hefty cost associated with these capital investments, the EPC process typically optimises the efficient use of the available resources on a project. The contractor must find the right balance between keeping the workforce productive to minimise their costs, maximise profit and keep a steady pace of progress to achieve the agreed-upon COD of the facility. As such, successful contractors aim to mobilise resources (labour and equipment) when there are sufficient work fronts available to keep a steady flow of production across the different disciplines on a project. Disruptions in that production line would result in either downtime of these resources (paying for the resources without any output), less than planned productivity (less than planned output for the resources utilised) or laying off resources and risk being unable to bring back the labour and equipment when these disruptions subside.

An example is found in wind projects that are largely governed by the need to move the top-out cranes that drive the completion of wind turbine generator tower erection through the blade assembly process. If insufficient tower sections and blades have been provided to maintain a continuous and efficient flow of work to the contractor, significant standby charges can be incurred on the project that will be assessed at the owner's cost if turbine supply is under the owner's responsibility. Another example is when owners are responsible for providing solar panels to contractors, but shipping and handling delays lead to loss of productivity and resulting in claims for inefficiency damages.

To compound these issues, covid-19 impacted the construction industry to differing degrees, depending on the type of work performed, the stage the project was in and the materials and components utilised in the construction of the project. In the United States, even though the construction industry was deemed an essential business and was exempt from shutting down, the industry was still heavily impacted. Impacts on renewable energy projects were typically felt in three distinct areas. First, in the manufacturing facilities that were fabricating and assembling the elements of the electromechanical components. Second, in the confined workspaces for workers, such as substations, power houses and inside the wind turbine generators. And finally, in the man camps where workers lived and socialised during off hours and when work forces were rotating in and out of the project for scheduled leave.

The shutting down of the manufacturing facilities and the closure of borders impacted the delivery dates of the critical components along with uncertainty as to the end date for these restrictions. This left owners and contractors with a dilemma. On one hand, owners typically claimed the impacts to the procurement process as a force majeure[13] event. On the other hand, contractors were resistant to bearing the additional cost of the impacts of covid-19 on the project, while being told to maintain progress (in less-than-ideal conditions) of work to continue construction as soon as the impacts subsided.

Covid-19 resulted in a rise in claims and disputes in the construction industry between the different project stakeholders. Owners typically claimed delay-liquidated damages for excessive delays by the contractor beyond the impacts of covid-19. Contractors typically claimed additional costs owing to impacts of events they viewed as outside the realm of force majeure. In addition, a wave of change in law claims arose in response to the many local, national and international responses to the covid-19 pandemic that were viewed by many to be beyond the four corners of the typical force majeure provisions.

While the effects of covid-19 have subsided for now, the construction industry awaits the next pandemic or major supply chain disruption event and continues to adapt to the global procurement strategies that are required for these technologically advanced and ever-evolving projects.

CONCLUSION

The surge in renewable energy projects across the Americas calls for a strong framework to handle construction disputes effectively. International arbitration emerges as a viable solution to address the distinct challenges encountered in construction cases involving renewable energy throughout the region. By involving impartial arbitral tribunals with specialised expertise in the sector, it becomes feasible to resolve disputes arising from regulatory frameworks, indigenous engagement, technological complexities and contractual issues. As the renewable energy sector continues to expand, the efficient resolution of disputes through international arbitration will play a pivotal role in promoting sustainable development and facilitating the deployment of clean energy projects.

The construction industry at large must evolve with the landscape of renewable energy development in the Americas. This evolution requires customising and clearly identifying the roles of the owner and the contractor as well as allocating risks in landscapes that are impacted by numerous external and internal forces. Owner and contractor interactions will benefit from maintaining a perspective on the economic-financial equilibrium of the projects that make them viable for both owners and contractors as the development progresses and encounters challenges from local communities, local authorities and an ever-changing financial and technological landscape. Finally, the nature of global procurement and supply chain dynamics is rife for disruption and delay as the world tackles pandemics, changing weather patterns and other potential disruptive sources. As owners and contractors navigate these troubled waters, they must stay attuned to the economics of these impacts and work together to minimise the disruptions and conflicts that arise from them.

Endnotes

1 Tax Incentives for Renewable Energy in Latin America, PWC, November 2020. ^ Back to section

2 Inflation Reduction Act Offers Significant Tax Incentives Targeting Energy Transition an d Renewables, White & Case, 17 August 2022. ^ Back to section

3 Tax Incentives for Renewable Energy in Latin America, PWC, November 2020. ^ Back to section

4 https://www.ilo.org/dyn/normlex/en/f?p=NORMLEXPUB:11300:0::NO:11300:P11300_INSTRUMENT_ID:312314:NO. ^ Back to section

5 IEA (2023), Latin America's opportunity in critical minerals for the clean energy transition, IEA, Paris https://www.iea.org/commentaries/latin-america-s-opportunity-in-critical-minerals-for-the-clean-energy-transition. ^ Back to section

6 In the case of wind farms, the wind turbines themselves could also be installed by the turbine supplier themselves and the BOP contractor would install the remainder of the facility such as the turbine foundations, site grading, collection and control systems and the substations. ^ Back to section

7 https://www.pilkington.com/en/global/knowledge-base/types-of-glass/solar-energy/solar-technologies/crystalline-silicon-photovoltaics#. ^ Back to section

8 https://www.energy.gov/eere/solar/cadmium-telluride#:~:text=The%20benefits%20of%20CdTe%20thin,electricity%20using%20a%20single%20junction. ^ Back to section

9 Average U.S. construction costs drop for solar, rise for wind and natural gas generators, EIA, 3 November 2020, https://www.eia.gov/todayinenergy/detail.php?id=54519. ^ Back to section

10 The asset lifetime cost includes development costs, operational expenses and any decommissioning costs at the end of the asset's lifetime. ^ Back to section

11 https://www.energy.gov/sites/prod/files/2015/08/f25/LCOE.pdf. ^ Back to section

12 Cost of Clean Energy Technologies, Drop as Expensive Debt Offset by Cooling Commodity Prices, BloombergNEF, 7 June 2023, https://about.bnef.com/blog/cost-of-clean-energy-technologies-drop-as-expensive-debt-offset-by-cooling-commodity-prices/. ^ Back to section

13 According to the American Bar Association, a force majeure is defined as 'a contractual provision that generally excuses performance obligations when circumstances or events arise beyond the parties' control that render performance of such contract impracticable or impossible'. However, contracts typically have sections that list all the provisions and components that define what constitutes a force majeure event in the agreement between the parties. ^ Back to section

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