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A Current Assessment of the Renewable Energy Industry

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Abstract:
Renewable energy capacity additions reached another record in 2021, as well as energy consumption. Despite logistical challenges, demand almost returned to pre-Covid levels, increased prices and challenges—moreover, the Russian Federation (from now on referred to as the Russian Federation). Energy and power sectors are reeling from "Russia's" invasion of Ukraine. An unprecedented energy crisis has arisen due to the collapse of the agriculture markets. As a result of energy prices rising, governments are trying to protect consumers, and efforts are being made to reduce dependence on Russian supplies and accelerate the process. Clean energy technologies are being transitioned to the use of renewable energy can reduce prices and dependence on fossil fuels. The long-term and short-term effects of fuels. The cost of installing solar PV and wind power is on the rise, despite the fact that prices of natural gas, oil, and electricity have risen in the last decade, reversing a decade-long trend of cost reductions. Due to the much faster rise in coal prices, the situation has improved more than before. Electricity generated from renewable sources is competitive. The question is, however, how quickly renewables can be implemented. Fossil fuel alternatives are subject to several uncertainties and will need to be dependent on several factors' impact.

Keywords: Renewable Energy, Renewable Capacity Forecast, Solar PV, Wind Costs.

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1. INTRODUCTION

The renewable energy market is continuing to experience substantial growth. In 2020, the global installed capacity of solar photovoltaics increased by almost 30%, while wind power grew by over 10% [1]. This strong performance has been partly driven by government policies and initiatives encouraging investment in renewables. Additionally, falling renewable technologies costs make it increasingly attractive for businesses and households

alike to switch away from traditional energy sources [2,3]. With further technological advances likely on the horizon, the outlook for this vibrant sector remains positive. Due to the continuing supply chain difficulties caused by the pandemic, construction delays, and record-level raw material and commodity prices, renewable capacity additions in 2021 increased by 6% and broke another record, reaching almost 295 GW. This growth is slightly higher than last year's forecast in the IEA's Renewables 2021. Globally, the 17% decline in annual wind capacity additions in 2021 was offset by an increase in solar PV and growth in hydropower installations [4,5].

The expansion of bioenergy, concentrated solar power (CSP), and geothermal was stable in 2021 compared with 2020. In terms of speed of growth, renewable capacity's year-on-year increase last year was slower, following an exceptional jump in 2020 when Chinese developers rushed to connect projects before the phase-out of subsidies, especially for onshore wind. The requirement in the United States (US) and the European Union is expected to decline by 10% in 2020 compared to 2019, doubling the global effect [6,7]. The Covid-19 crisis has had an economic and environmental impact on global energy consumption. Renewable net capacity additions for 2019-2021 are shown in Figure 1.

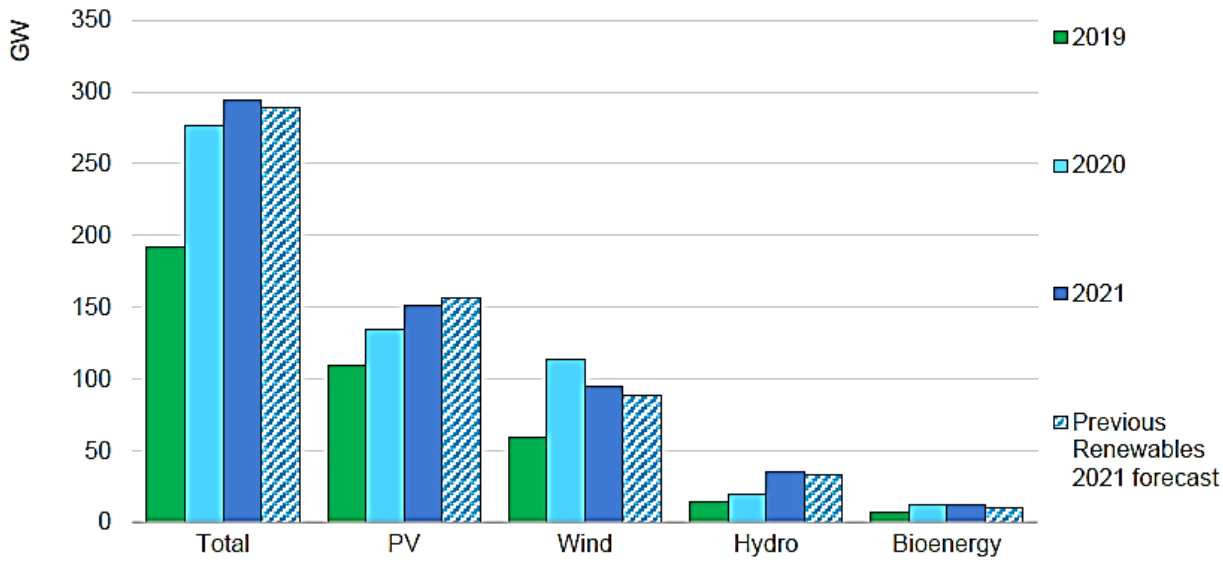

Figure 1: Renewable net capacity additions, 2019-2021

Increasing capacity enabled the European Union to become the second-largest market outside of China in 2011, surpassing for the first time the record. Due to a combination of government-led auctions and distributed solar PV incentives, solar PV accounted for a large share of the European Union's expansion last year [8]. As a result of lower production tax credit (PTC) rates in the United States, onshore wind additions declined by one-quarter [4,5]. As supply chain and logistical challenges slowed much faster growth, the investment tax credits (ITC) available until 2023-2024 provided a relatively stable policy environment for solar PV expansion. Additions to renewable capacity in countries and regions, 2019-2021 are shown in Figure 2.

Due to the challenges associated with Covid-19, India's renewable energy growth slowed down in 2020. With the accelerated deployment of distributed PV systems and the commissioning of already auctioned utility-scale. Compared to 2020, India's renewable capacity additions more than doubled in 2021 due to policy improvements [9,10]. Distributed PV installations in Brazil surged due to generous net metering incentives, while onshore wind additions accelerated because of supportive economics Market prices are determined by the free market. A previously awarded solar and wind project in South Africa has begun to be commissioned, indicating a boost in renewable capacity additions [12,13]. A phase-out of Viet Nam's generous feed-in tariff (FIT) scheme halved the country's reserves between 2020 and 2021. This resulted in a 40% decline in ASEAN's annual installations year-on-year, though they remain slightly higher than in 2019.

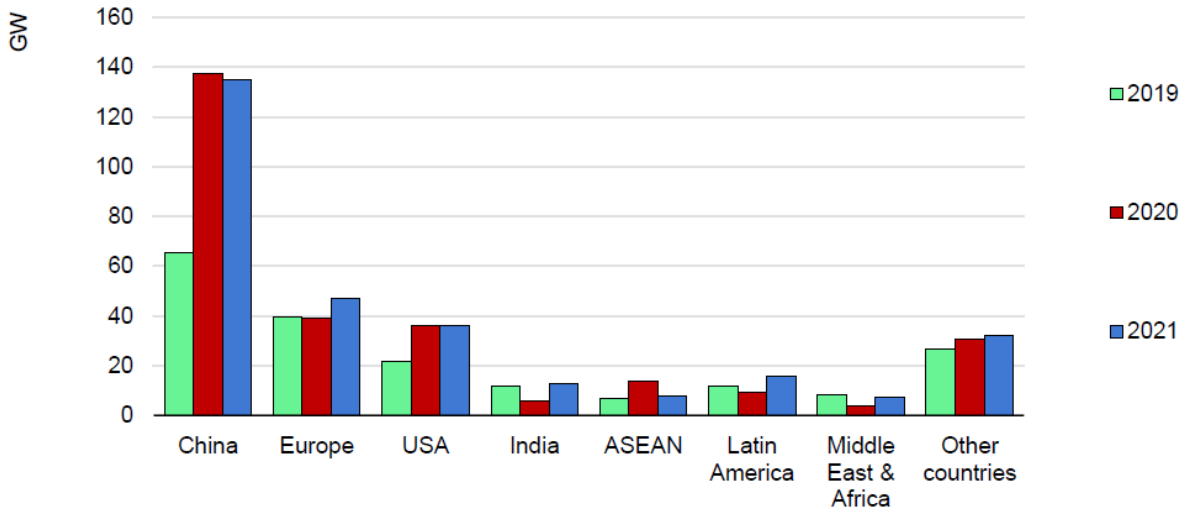

Figure 2: Additions to renewable capacity in countries and regions, 2019-2021

The current state of the renewable energy market has been an incredible boon to our environment and economy. Renewable energy sources such as solar, wind, and geothermal have seen dramatic cost reductions in recent years due to technological advancements and economies of scale [14]. This has allowed more businesses and households to access clean power at competitive prices, significantly reducing their carbon footprint while providing a reliable source of Electricity. Furthermore, investments in renewable energies are creating jobs worldwide while helping countries transition from polluting fossil fuels towards cleaner alternatives with less environmental impact. The renewable energy market focuses on the current state of renewable energy markets and their future potential. The methodology used to conduct this research includes a comprehensive review of existing literature, data collection from industry experts, and interviews with key stakeholders in the sector. In addition, authors have conducted the market analysis using publicly available sources such as government reports and statistical databases to assess current trends in renewable energy markets globally. Furthermore, we have utilized advanced modelling techniques to forecast future growth rates for various renewable energy technologies.

The deployment of renewable capacity in China would account for 46% of the worldwide increase in 2021. Chinese capacity has decreased 2% year-over-year due to developers racing to complete projects before the subsidy expiration deadline in 2020, resulting in onshore wind installations that were 55% and 22% below prior boom cycle levels. The availability of subsidies through 2021 helped offshore wind, residential solar PV and bioenergy add new capacity annually. In comparison to 2020, offshore wind new installations increased almost sixfold in 2021. Furthermore, multiple units at the Chinese Baihetan hydropower plant were commissioned, accelerating hydropower expansion worldwide. The rest of the article is structured as follows: the introduction is replaced in Section 1, Literature Review is positioned in Section 2, the method is presented in Section 3, and Section 4 is denoted for the renewable capacity forecast. The Solar PV and costs are presented in Section 5. Section 6 presents the results and discussions of the article. Finally, the article's summary conclusion draws then followed by an acknowledgement and a list of references.

2. RENEWABLE CAPACITY FORECAST

By 2022, renewable capacity will have surpassed 300 GW for the first time, an increase of over 8% over last year. With the commissioning of 190 GW this year, solar PV is expected to account for 60% of the increase in global renewable capacity [15]. Nearly two-thirds of overall PV expansion will be from utility-scale projects in 2022, mainly because China and the EU will adopt more robust policy environments. Almost 80 GW of new onshore wind installations is expected to be installed globally in 2022 after falling by 32% year-over-year in 2021. Net renewable capacity additions by technology, 2017-2023, are illustrated in Figure 3. Due to China's national subsidy phase-out deadline, offshore wind growth worldwide is expected to decline by 40% in 2022 [4]. As a result of ongoing provincial incentives in China and the expansion in the EU, global offshore wind capacity additions will double in 2022 compared to 2020. Therefore, China will have the most significant cumulative offshore wind capacity globally this year, surpassing the European Union and the United Kingdom combined [16].

The global addition of renewable capacity is expected to remain stable in 2023 unless new and more vigorous policies are implemented. A 40% reduction in hydropower additions due to a reduced project pipeline in China stymies capacity growth in the global renewable energy market even though solar PV is forecast to reach almost 200 GW by 2023, and wind and bioenergy expansions remain stable. Regrettably, storage capacity fell by nearly 30 percentage points in 2019 as 2.9 GW has been added to world energy systems [17,18]. Since the review year and in 2018, once Korea implemented one-third of the world's potential, yearly setups in Korea ended up falling by 80%. A few substantial storage fires at power station plants contributed to the drop in 2018. Furthermore, India has expressly compensated for this implementation by proposing 1.2GW of solar-plus-storage auction sites in 2019, going to require storage implementation for 50% of installed capacity. Singapore might have established a goal of 200 MW storage capacity for 2025.

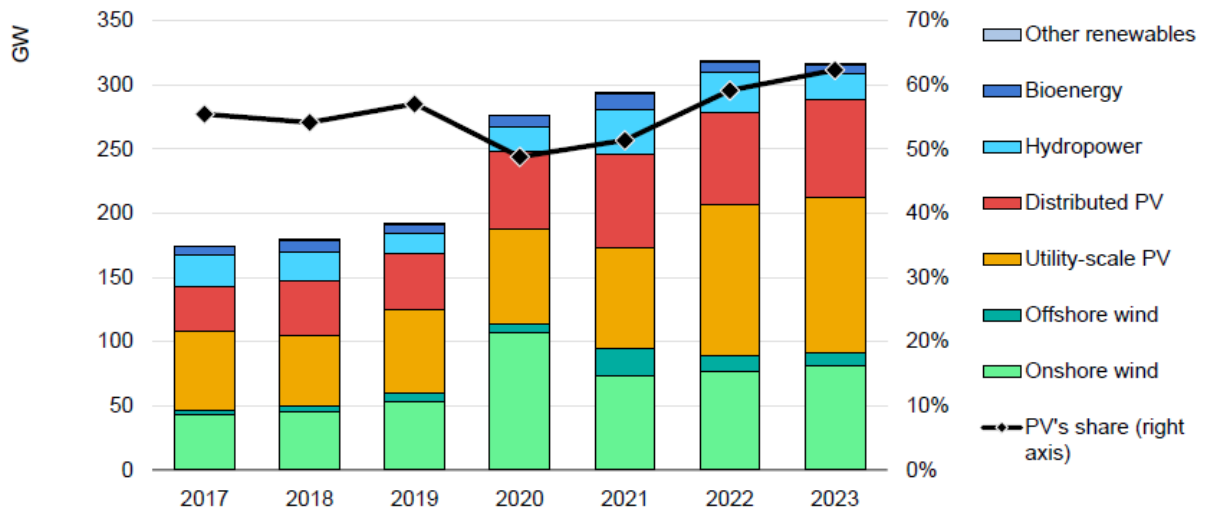

Figure 3: Net renewable capacity additions by technology, 2017-2023

3. SOLAR PV AND WIND COSTS

Since the beginning of 2021, many raw materials prices and freight costs have increased. It was estimated by March 2022 that PV-grade polysilicon would cost more than quadrupled, steel would rise by 50%, copper would increase by 70%, Aluminium would double, and freight costs would rise almost fivefold. Wind turbines and PV modules have reversed the long-term trend of decreasing costs as manufacturers pass through increased equipment costs [19]. By 2022, we estimate that utility-scale PV and onshore wind plants will cost 15% to 25% more than they did in 2020. Cost increases for onshore wind are mainly due to surging freight costs. The impact of rising freight, polysilicon, and metal prices on solar PV is more evenly distributed. Investing in solar PV and onshore wind under high commodity prices: investment cost estimates are presented in Figure 4.

Although renewables costs have increased significantly in absolute terms, their competitiveness has not been affected since fossil fuels and electricity prices have been rising much faster. Many wholesale electricity markets are experiencing record power prices globally, especially where natural gas is the marginal technology setting the final hourly or daily fee. German, French, Italian and Spanish wholesale power prices increased more than six fold on average from 2016 to 2020, compared with mean values in the rest of the European Union. Most large European Union markets have seen long-term contract prices higher than wholesale prices [16-19].

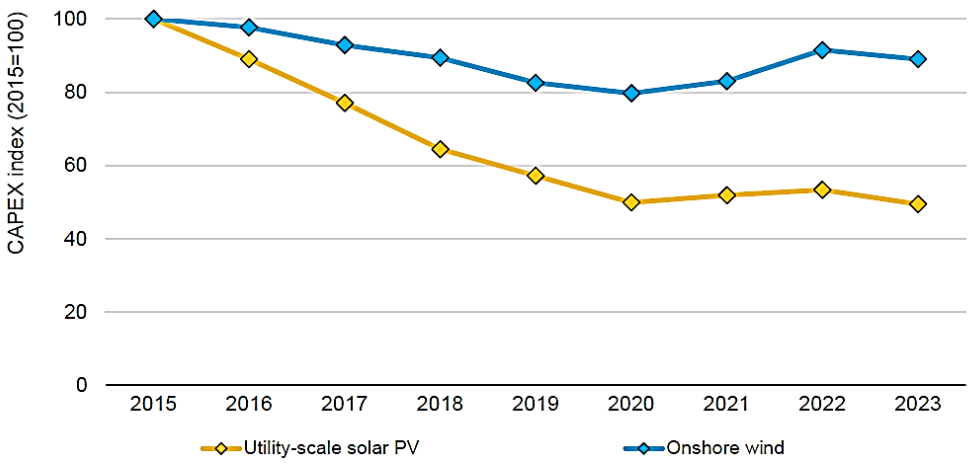

Figure 4: Investing in solar PV and onshore wind under high commodity prices: investment cost estimates

Despite these high prices, even the most expensive onshore wind and utility-scale contracts signed over the last five years are half as much as the average wholesale prices in the EU today [4]. Recently contracted onshore wind and solar PV companies are offering long-term contracts significantly lower than wholesale price averages over the last six months, even though costs have increased. Prices for utility-scale projects, for instance, during the recent Spanish auction held in December 2021, solar PV and onshore wind projects increased 15-25% to USD 37/MWh and USD 35/MWh, respectively.

4. RESULT AND DISCUSSION

The renewable energy market has grown significantly over the past decade and continues expanding rapidly. The increased demand for clean, sustainable energy sources has driven the development of a wide range of renewable technologies that are now being used in homes and businesses worldwide. This article will discuss some key results from recent studies on the current state of this dynamic industry and potential implications for its future growth. According to a report by Bloomberg New Energy Finance (BNEF), more than half (54%)of all new power capacity added globally in 2020 was from renewables such as wind and solar – up from just 11% two decades ago. In addition, investments in clean energy projects reached an all-time high last year at $501 billion – nearly double what it was five years prior ($280 billion). These developments have been particularly beneficial for developing countries which have seen their share of global investment rise dramatically since 2010, currently accounting for 40% compared to only 15%. These findings demonstrate strong momentum behind renewable energies worldwide, with no signs indicating any slowing down anytime soon. With increasing government support alongside technological advancements driving costs lower every day, authors can likely expect continued growth throughout 2021 and beyond - potentially surpassing previous records set last year.

5. CONCLUSIONS

Renewable capacity is expected to reach a new milestone of over 300 GW for the first time, representing an 8% increase from 2021. Solar PV will be responsible for 60% of this growth and is predicted to commission 190 GW this year. Utility-scale projects are forecasted to account for two-thirds of total PV expansion in 2022 due mainly partly to more robust policy environments being implemented by China and the European Union. Onshore wind installations are also projected at nearly 80 GW globally next year after experiencing a 32% decrease from 2021 levels. In addition, China continues to be a leader in renewable energy expansion, with an estimated 45% of global capacity additions in 2022-2023. This is primarily driven by the deployment of over 140 GW on average per year, mostly from large-scale solar PV projects. This trend is fully aligned with China's 1 200 GW wind and solar PV target by 2030, and annual additions are expected to remain slightly higher than in 2020-2021 when incentive phase-out schedules for onshore wind and utility-scale PV in 2020, as well as offshore wind and residential PV 2021, were implemented. These ambitious targets demonstrate that China remains committed to its goal of transitioning towards clean energy sources. In this context, the European Union's large markets have seen long-term contract prices higher than wholesale prices. Despite these high costs, the most expensive onshore wind and utility-scale contracts signed over the last five years are still half the average wholesale prices today. In recent times, companies offering long-term contracts for onshore wind and solar PV projects have been able to offer significantly lower rates than those found in the EU's six-month averages, even though their expenses have increased. This was evidenced by a Spanish auction held in December 2021, where bids for solar PV and onshore wind projects increased 15-25%, with successful bidders paying USD 37/MWh and USD 35/MWh, respectively.

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