

# ***A Review of the Global Economic Shock in 2022 and a Prediction of the Global Economic Development in 2023***

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**Abstract:** In 2022, affected by global macroeconomic fluctuations, the economies of some countries around the world have experienced obvious fluctuations, thereby promoting inflation in various countries and limiting the rapid development of some industries around the world. This paper reviews the global economic shock in 2022 and analyzes the impact of China's economy on global economic development from the perspective of the new energy sector. As an important part of new energy, the photovoltaic industry can be analyzed to obtain a development forecast of the global economy in 2023. By analyzing the development of the photovoltaic industry, it is concluded that China's economy and the global economy will show a recovery trend in 2023.

**Keywords:** macroeconomic, photovoltaic, stock

## **1. Introduction**

Affected by macro factors, the global economy suffered a huge shock in 2022. China is one of the countries with a great influence on the global economy, and the analysis of China's economic trend in 2022 can most intuitively reflect the huge challenges facing the global economy in 2022. The stock market and the new energy industry are indicators that can most intuitively reflect the economic development trend of various countries. Therefore, this paper initially analyzes the global macroeconomic development situation in 2022 and the events affecting the macroeconomy around the world. Secondly, it mentions the impact of China's economy on global economic development, and made a short industry analysis of the photovoltaic industry, which has developed well in recent years. By comparing industry development and macroeconomic development situation, the future global macroeconomic development trend can be predicted.

## **2. An overview of the Global Economic Situation in 2022**

### **2.1. The Federal Reserve's Unprecedented Rate Hike**

At its September meeting, the Fed raised rates by 75 basis points for the third time in a row, reaching the range of 3%-3.25% [1], and is expected to raise rates by another 75 basis points at its meeting in early November. Six large banks, including JPMorgan Chase and Citigroup, announced their quarterly results earlier, citing decades of high inflation in the United States, a rapidly slowing housing market, and the Federal Reserve's unprecedented rate hike. Inflation expectations have

continued to deteriorate across the U.S. for months, with the consumer price index rising 8.2% in September from a year earlier. In the face of high inflation, the Fed has raised interest rates three times in a row, raising short-term interest rates to a range of 3% to 3.25%, the highest level in 14 years. The outside world criticizes that the Fed's series of measures may trigger an unnecessary deep recession.

## 2.2. The Russia-Ukraine Conflict

As the Russia-Ukraine war evolves, skyrocketing food and fertilizer prices caused by the Russia-Ukraine conflict are causing the worst global food crisis since 2008, putting the lives and livelihoods of hundreds of millions of people at risk. Over the past period, electricity prices in Europe have soared. If converting Germany's sky-high electricity bill into a crude oil bill, it will be equivalent to \$1,000 per barrel [2]. Reduced Russian supplies to Europe, combined with the approach of winter, have pushed European gas prices to about 13 times the seasonal normal price. This week, Germany's benchmark electricity price broke through the €700 mark for the first time, reaching a record €710/MWh. Gazprom announced on Friday that it would suspend gas supplies through the Nord Stream 1 pipeline from August 31 to September 2. Although Gazprom stressed that gas transmission would return to 33 million cubic meters per day (20% of full capacity) once the work was completed and the installation had no technical failures, it still caused panic in the market, and many feared that Russia may not resume supplies on time. According to statistics, since the beginning of the year, the flow of Russian gas to Europe through the main pipelines has fallen by about 75%. The damage to the Nord Stream gas pipeline on 2022.9.27 has brought more uncertainty to the European and international energy markets, and also continues to affect changes in the international market. Behind the sky-high energy bills, there is naturally a runaway high inflation rate. 23.2% is Estonia's year-on-year CPI growth data in July and the highest inflation rate in the EU27 for the month. Soaring inflation is making more and more Europeans nervous. In the foreign exchange market, the euro is gradually depreciating, the outbreak of the Russia-Ukraine crisis and the derived European energy crisis have dealt a heavy blow to people's confidence in the euro exchange rate.



Figure 1: Shanghai securities composite index (Source from Eastmoney Securities).



Figure 2: Dow Jones Indexes (Source from Eastmoney Securities).

### 2.3. The Stock Market in China

China, the world's second-largest economy, has also been hit hard by economic fluctuations in 2022, and the stock market can reflect a country's economic development. As seen in Figure 1, China's stock market fluctuated greatly in 2022, and in 241 trading days in 2022. The Chinese stock market fell by 21.56% at the beginning of the year. After bottoming out on April 28 and rebounding to highs, it then began to fall again and began to rebound at the end of the year. As seen in Figure 2, compared with the US stock market, the Chinese and American stock markets have certain similarities, and through comparison, it can be seen more definitely that the global economy has been greatly impacted and affected in 2022.

## 3. Analysis on the Global Economic Changes from the Perspective of the Photovoltaic Industry

With the continuous changes in the global focus industry, the photovoltaic industry has become one of the main focus industries in recent years, and the analysis of the development of the industry in 2022 can also reflect the development of some industries around the world, thereby confirming that the global economy fluctuates greatly in 2022, which has caused a huge impact on some industries.

As a kind of clean energy, Solar energy's rich resources and wide application advantages are gradually reflected, while with the technological progress of the photovoltaic industry, power generation costs are also continuing to decrease, due to the rapid consumption of fossil energy in the new year, resulting in price increases, reserves in various countries gradually reduced, the same use of chemical energy power generation will aggravate air pollution, so electricity will become the mainstream energy of human beings in the future. At present, the change in photovoltaic parity has accelerated, and the installed capacity of the global photovoltaic market is expected to continue to maintain stable growth. The goal of carbon neutrality in various countries is clear, and the transformation of energy structure is the general trend.

At present, as shown in Table 1 there are 138 countries around the world have set carbon neutrality goals, promoting the construction of renewable energy such as wind and solar to the national strategic height. At the same time, with the acceleration of carbon neutrality and the improvement of environmental protection requirements in various countries, the environmental costs faced by non-clean energy power generation such as thermal power have gradually increased, the long-term upward

trend of global electricity prices is clear, the economy of photovoltaic power generation is prominent, and the global demand for new photovoltaic installations will maintain a high growth rate in the future.

Table 1: Major national carbon neutrality targets (Source from Eastmoney Securities).

Country	Update time	Midterm target year	Medium-term goals	Final target year	The ultimate goal
United States	2022/5/18	2030	Base year: 1,990 Emission reduction: 6-8%	2050	Carbon neutral
Netherlands	2022/5/23	2030	Base year: 1,990 Emission reduction: 49%	2050	Carbon neutral
Germany	2022/6/1	2030	Base year: 1,990 Emission reduction: 65%	2045	Base year: 1,990 Emission reduction: 95%
France	2022/4/24	2030	Base year: 1,990 Emission reduction: 5-5%.	2050	Carbon neutral
Spain	2022/6/22	2030	Base year: 1,990 Emission reduction: 23%	2050	Carbon neutral
Korea	2022/6/22	2030	Base year: 2017 Emission reduction: 24.4%	2050	Carbon neutral
Japan	2022/6/22	2030	Base year: 2013 Emission reduction: 46%	2050	Carbon neutral
Canada	2022/4/24	2030	Base year: 2006 Emission reduction: 45%	2050	Carbon neutral
Singapore	2022/11/22	2030		2050	Carbon neutral
China	2022/6/1	2030	Base year: 2,005 Emission reduction: 65%	2050	Carbon neutral
Australia	2022/4/26	2030	Base year: 2,005 Emission reduction: 26%	2050	Carbon neutral
United States	2022/8/26	2030	Base year: 2010 Emission reduction: 60%	2050	Carbon neutral
Canada	2022/4/24	2030	Base year: 2,005 Emission reduction: 45%	2050	Carbon neutral

### 3.1. Domestic Photovoltaic Market

Domestic planning projects are rich in reserves, and the whole county promotes + economic acceleration of distributed installation. According to the planning of the National Development and Reform Commission and the Energy Administration, the total construction scale of the first batch of wind and solar bases is 97.05GW, of which 45.71GW is expected to be put into operation in 2022 and 50.34GW in 2023; The total installed capacity of the second batch of large wind and solar bases is planned to be about 455GW, of which more than 200GW will be connected to the grid during the "14th Five-Year Plan" period; The third batch of large bases has entered the project application stage. According to the "14th Five-Year Plan" renewable energy development plan issued by various provinces and cities, the total planned installed capacity of wind and solar during the "14th Five-Year Plan" period in China will reach 874GW, of which the installed capacity of photovoltaics is expected to be about 550GW, supporting the average annual grid connection of power stations during the "14th Five-Year Plan" period of more than 100GW. In the past two years, the demand for the domestic

distributed photovoltaic market has continued to grow, mainly due to the implementation of policies and the improvement of the photovoltaic installed economy in the whole country. In the first three quarters of 2022, domestic distributed and centralized PV installed capacity reached 35.72GW and 17.44GW respectively, a year-on-year increase of 117.72% and 90.61% [3].

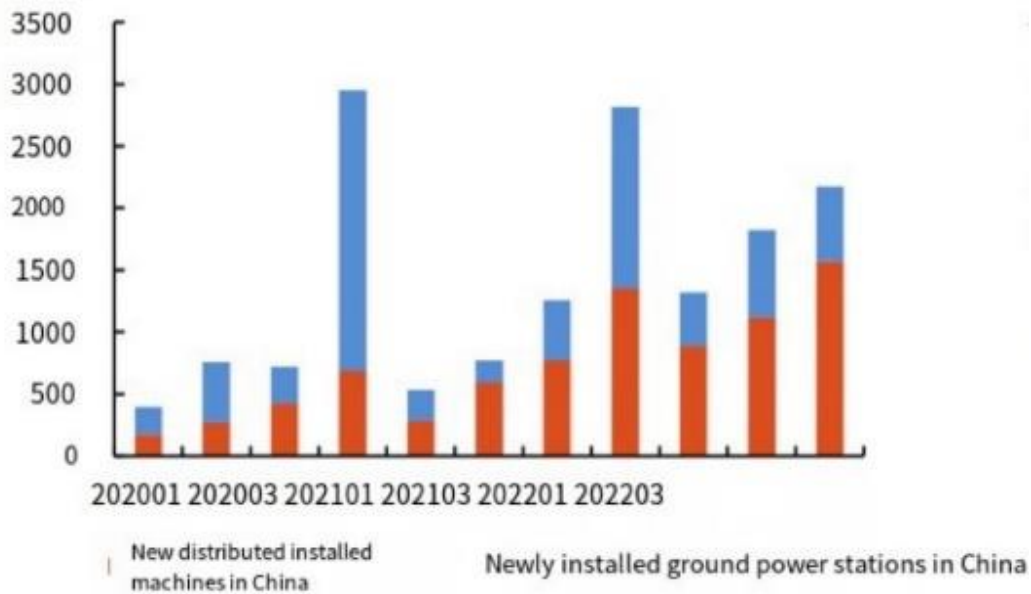


Figure 3: Structure of newly added photovoltaic installations in China (10,000 kW) (Source from Eastmoney Securities).

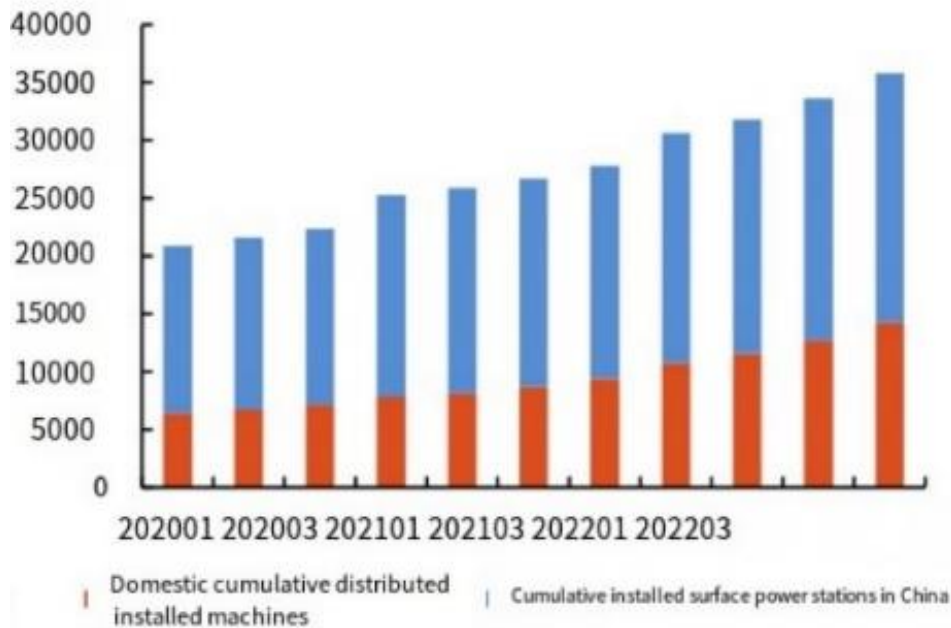


Figure 4: Cumulative installed PV structure in China (10,000 kW) (Source from Eastmoney Securities).

### 3.2. Overseas Photovoltaic Market

The energy crisis has strengthened the demand for energy independence in various countries, the demand for overseas installations is strong, and module exports continue to increase. According to Solar Power Europe, the cumulative installed capacity of EU photovoltaics in 2030 will reach 1050GW in the acceleration scenario, which is a significant increase compared with before the Russian-Ukrainian conflict. In the United States, the IRA bill was passed in August 2022, which is expected to stimulate the explosion of demand for renewable energy installations, while the marginal improvement of US trade policy towards China, the Southeast Asian anti-circumvention exemption was finalized on September 22, and the components seized due to UFLPA began to be gradually released in December. From the perspective of domestic exports, module exports from January to November 22 were 39.89 billion yuan, a year-on-year increase of 56.92%, considering the high overseas inventory and seasonal impact, it is expected that module exports will usher in rapid growth again after March 23.

Demand at home and abroad resonates, and the photovoltaic boom accelerates. The transformation of overseas energy structure has accelerated, photovoltaic installations may continue to exceed expectations, domestic large base planning supports the medium and long-term growth of power station demand, and the economy promotes the continuous high growth of distributed installed capacity. It is estimated that the global new installed capacity of photovoltaics in 2022/2023/2025 will be 250/350/500GW respectively, with a compound growth rate of 30.01% from 2021 to 2025.

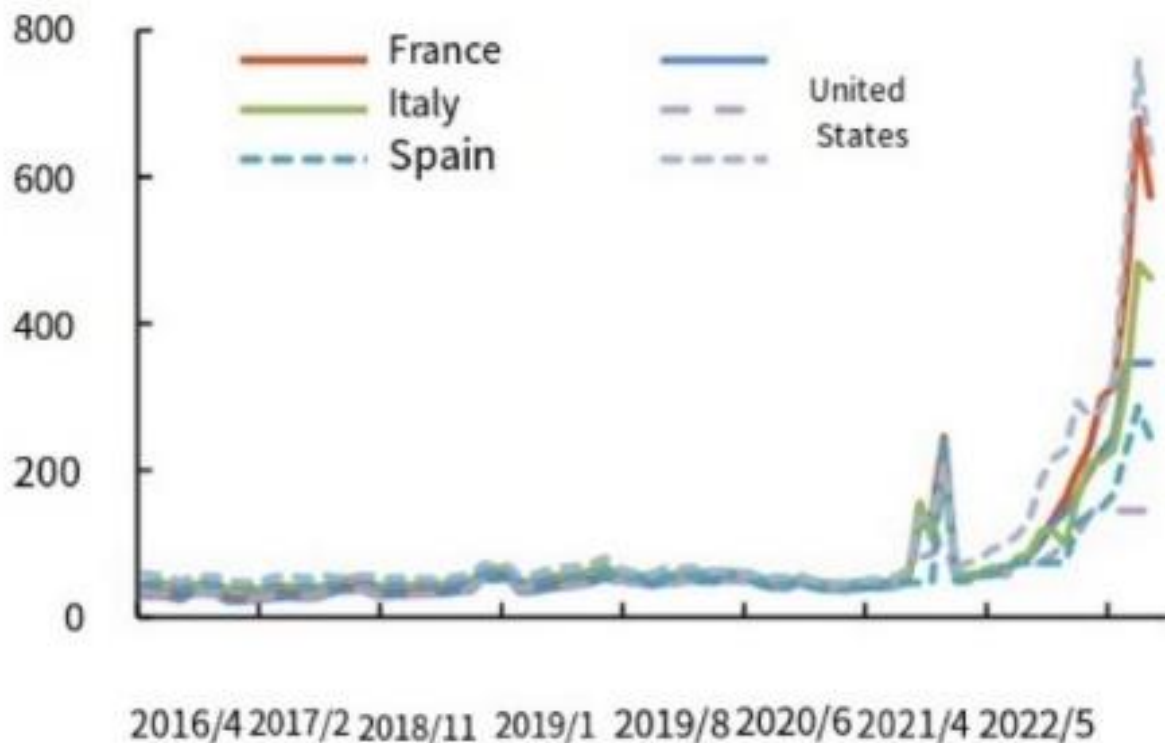


Figure 5: Electricity prices in major European countries (EUR/mwh) (Source from Eastmoney Securities).

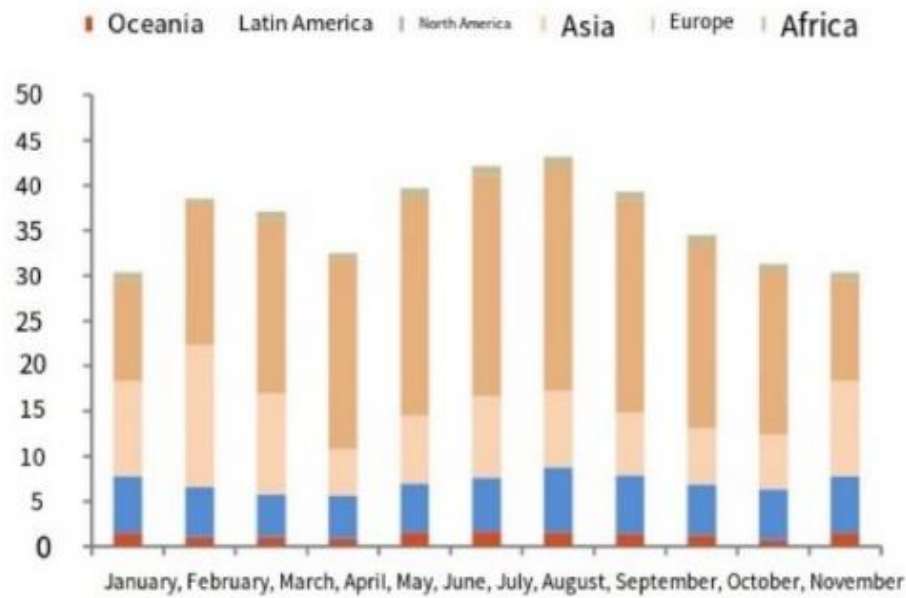


Figure 6: 22 Domestic component export situation (Source from Eastmoney Securities).

Table 2: U.S. trade policy is gradually improving (Source from Eastmoney Securities).

Time	Progress
2022/2/8	Auxin Solar filed a real-name petition to investigate PV cells and modules from manufacturers in Dongpuzhai, Malaysia, Thailand and Vietnam.
2022/3/28	The U.S. Department of Commerce announced on 3/28 that it would launch an anti-circumvention investigation against manufacturers in Shupu Village, Malaysia, Thailand, and Vietnam
2022/4/20	The U.S. Department of Marketing announced a list of manufacturers that need to respond to the lawsuit in four countries, but Beicha will be "unfavorably presumed" for the whole territory investigation, and almost all manufacturers will submit questionnaires.
2022/6/6	The White House statement released a two-year tax holiday against circumvention in Southeast Asia
2022/6/21	The UFLPA Xinjiang Human Rights Act was officially implemented
2022/9/16	Southeast Asia Anti-Circumvention Exemption 24-month Final Rule Disclosure, First Mention Anti-National Accumulation Conditions
2022/12/1	The U.S. Department of Commerce announced the preliminary ruling of the anti-circumvention lawsuit, and four of the eight manufacturers were found to be anti-circumvention facts, namely BYD Hong Kong (Shupu 2022/12/1 Zhai), Canadian Solar (Thailand), Trina Solar (Thailand), Vina Solar (LONGi Holdings, Vietnam). New Eastsolar Hanwha (Malaysia), Jinko (Malaysia), and Boviet (Vietnam) do not circumvent.
2022/12/2	Phase-out of UFLPA's seized modules, the first batch of which has already been launched on the U.S. market, mainly for modules produced by JinkoSolar from WACKER silicon.

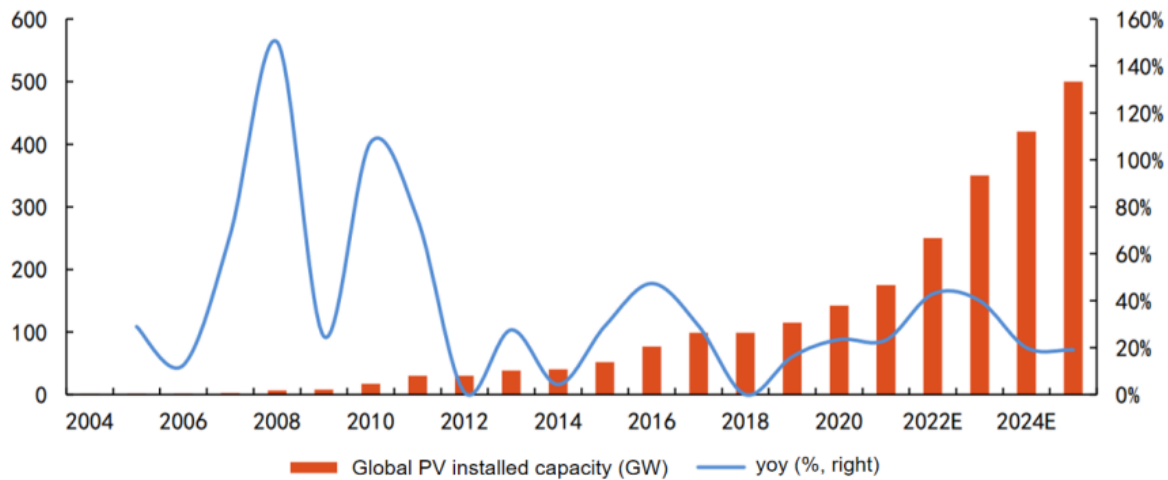


Figure 7: 2004-2025E global photovoltaic new installation (GW,%) (Source from Eastmoney Securities).

#### 4. Prediction on the Global Economic Trend from the Perspective of the Photovoltaic Industry

With the gradual release of polysilicon production capacity, the price of the photovoltaic industry chain continued to decline. According to PVInfolink, as of January 5, 2023 polysilicon: the price of dense materials fell to 190 yuan/kg, down 37% from the high point on November 17, 2022 (down 113 yuan/kg in price) [4]; 182/210 size silicon wafers: prices fell to 3.9/5 yuan/piece, down 48%/49% from the high on November 17, 2022 (price down 3.6/4.7 yuan/piece); 182/210 size cells: prices fell to 0.8/0.8 yuan/W respectively, down 41%/40% from the high on November 24, 2022 (price down 0.55/0.54 yuan/piece) [5]; 182/210 size module: The price fell to 1.83/1.83 yuan/W respectively, down 8%/8% from the high on November 17, 2022 (the price decreased by 0.15/0.15 yuan/piece). Short-term: The price of the photovoltaic industry chain is declining, which promotes the demand for expansion of production in all links and spawns the demand for equipment. With the release of polysilicon production capacity and the downward price of the industrial chain, module prices are expected to move towards 1.6-1.7 yuan/W, promoting downstream demand and strengthening the growth attributes of the photovoltaic industry. Related materials show that TOPCon production expansion is expected to reach nearly 200GW in 2023, a year-on-year increase of more than 2 times, and related materials show that the global new installed capacity demand is expected to reach 1189-1472GW in 2030, with a CAGR of 23% from 2022 to 2030 - 26%. The new photovoltaic technology has promoted the industry's "cost reduction and efficiency increase", and the demand continues to be released [5].

"Cost reduction and efficiency increase, scientific and technological innovation" is the eternal theme of photovoltaics, focusing on the iteration of various new battery technologies such as HJT/TOPCon/xBC. TOPCon equipment: It is expected that 2023-2025 will be the peak of TOPCon expansion, with a total market size of 110.7 billion yuan (annual average of 36.9 billion yuan) [6]. HJT equipment: It is estimated that the order space of HJT equipment in 2025 will exceed 60 billion yuan, and the CAGR will be 98% from 2020 to 2025, which will increase the demand for battery + module equipment expansion. At the same time, the domestic replacement of core components + HJT slurry of battery equipment is expected to become an important breakthrough in the next stage, which will gradually increase from 1 to N in the process of the industry. Photovolt belongs to the pan-



semiconductor industry. The core equipment and components of photovoltaic have the potential of industry extension as well as future extends to electroplated copper, perovskite, and pan-semiconductor equipment to open up medium and long-term development space.

The Russia-Ukraine conflict has accelerated the transformation of the energy structure of various countries, and overseas countries have increased their carbon neutrality policies. The Russian-Ukrainian conflict has triggered the European energy crisis, the volatility of natural gas prices has intensified, the electricity prices of various countries have soared, energy security and independent demands have been enhanced, and European countries have continued to increase carbon neutrality policies and accelerate the transformation of energy structure in order to get rid of their dependence on Russian energy. In May this year, the EU's REPowerEU plan was launched, raising the 2030 renewable energy target from 40% to 45% [7]; Britain and Germany have also raised their PV installation targets for 2030 and 2035, and in November this year, the European Commission proposed temporary emergency measures to simplify the approval process for new energy projects and promote large-scale installations [3].

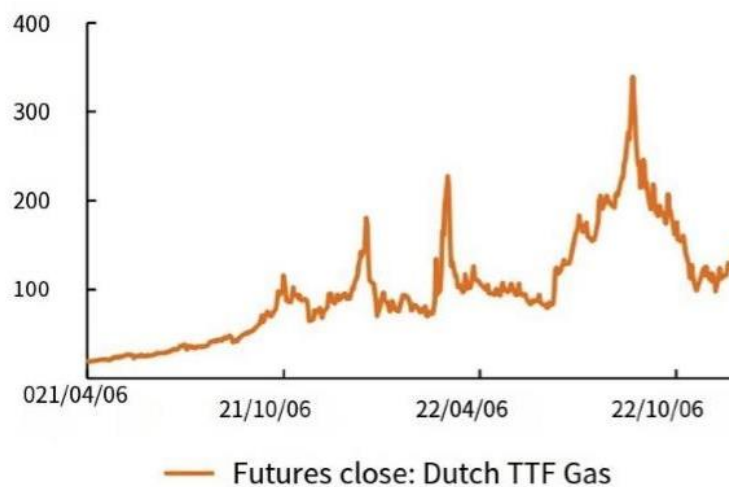


Figure 8: Increased volatility in Dutch TTF natural gas futures [5].

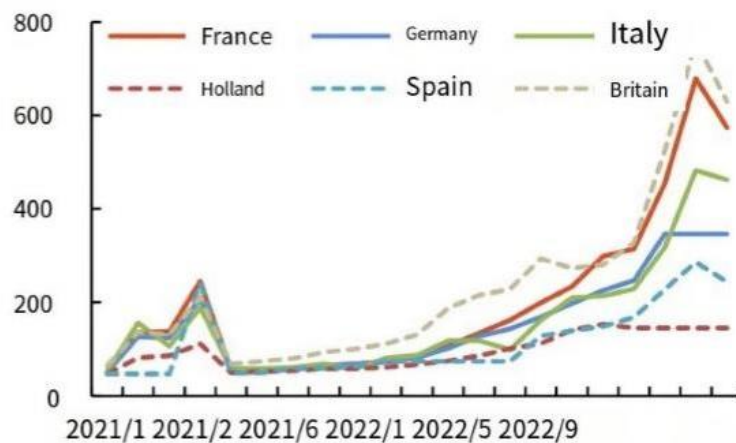


Figure 9: Electricity prices are soaring in major European countries [5].

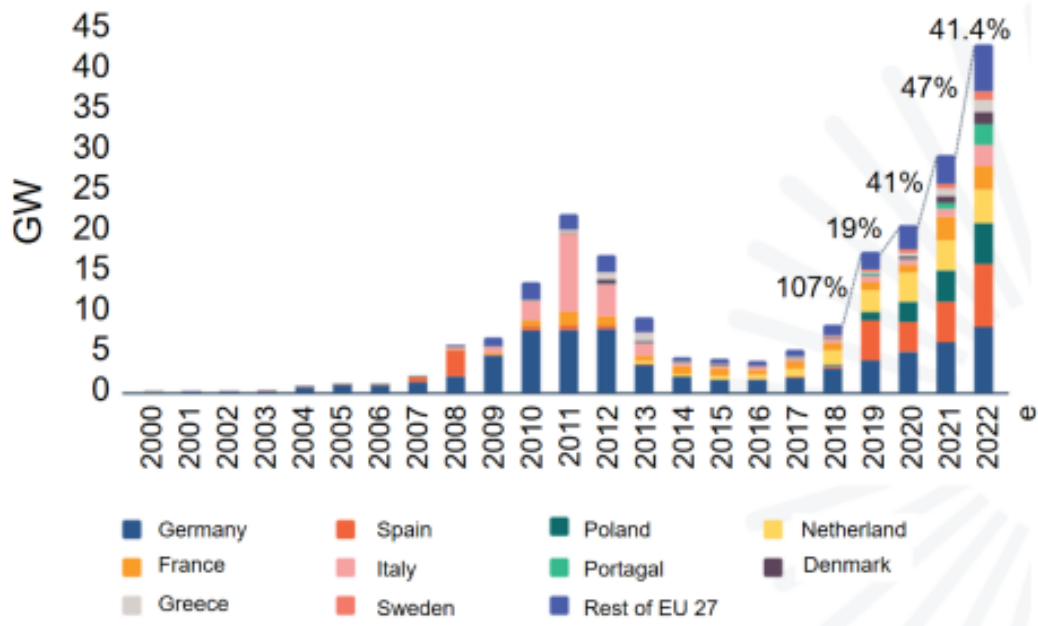


Figure 10: 27 European countries new installed capacity (GW) of photovoltaic [5].

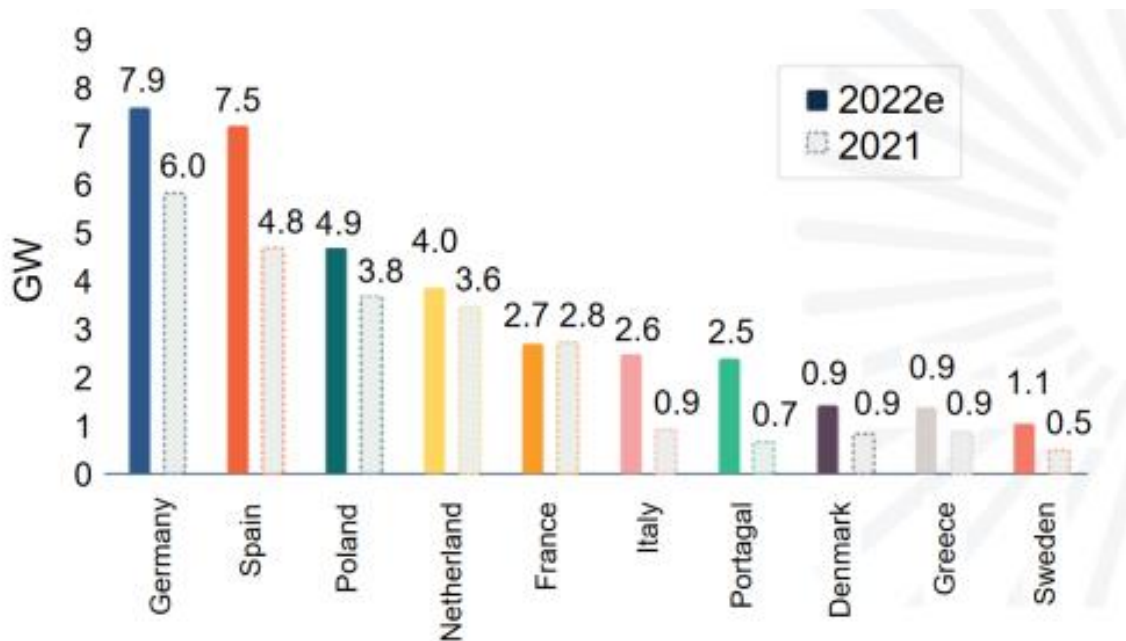


Figure 11: Top 10 countries in Europe with installed PV capacity in 2022 [5].

European PV demand exceeded expectations, and the annual installed capacity is expected to exceed 41GW. According to Solar power Europe statistics, the 27 European countries installed 41.4GW of new PV capacity in 2022, a year-on-year increase of more than 47%, of which Germany, Spain, and Poland led the way in new installations, achieving 7.9GW, 7.5GW, and 4.9GW of new PV installations respectively [8]. The EU launched emergency measures at the end of the year to

simplify the approval process of photovoltaic projects, shorten the approval cycle of distributed and centralized photovoltaic projects, and superimpose the increase in subsidies in various countries, and install photovoltaic in Europe in 2023. The machine is expected to maintain rapid growth. According to Solar power Europe, under optimistic conditions, European PV installed capacity can reach 67.8GW in 2023, which is still a significant increase from this year.

In 2023, as the epidemic situation in various countries gradually slows down and trade between countries gradually recovers, it will also accelerate the construction of a community with a shared future for mankind. Under the background of "carbon neutrality and carbon peaking", the field of new energy will continue to develop rapidly. With the slowing Russia-Ukraine conflict and the weakening of the impact on the global economy, the global economy is expected to recover and return to normalcy in 2023 [9].

## 5. Conclusion

By analyzing the global macroeconomic development trend, it can be seen that the global economy has encountered great challenges in 2022 and the downward trend is more obvious, but the development of popular industries has not been hindered. On the contrary, it has gone against the wind to a higher level. With the gradual stabilization of the global macro situation, the liberalization of the epidemic, the gradual slowdown of interest rate hikes in the United States, and other things are gradually normalized. It is believed that the global economic development will gradually recover in 2023, and there may be new opportunities and breakthroughs. Looking back at 2022 and looking forward to 2023, the global economy is bound to gradually return to normalcy.

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