

Polysilicon Market - Global Industry Size, Share, Trends, Opportunity, & Forecast 2018-2028 By End User Industry (Solar PV {Monocrystalline Solar Panel and Multi crystalline Solar Panel}, Electronics {Semiconductor}), By Region, Competition

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Report description:

Global Polysilicon Market has valued at USD 2.14 billion in 2022 and is anticipated to project robust growth in the forecast period with a CAGR of 3.85% through 2028.

The global polysilicon market is a critical player in the renewable energy landscape, serving as a fundamental raw material in the production of solar photovoltaic (PV) cells. As the world transitions towards cleaner and more sustainable energy sources, the demand for polysilicon has witnessed unprecedented growth.

The polysilicon market's dynamics are intricately linked to the solar energy industry, where polysilicon plays a pivotal role in converting sunlight into electricity. The global push for renewable energy, driven by concerns over climate change and the depletion of traditional energy resources, has fueled the demand for polysilicon. The increasing adoption of solar power as a viable and sustainable energy source has significantly contributed to the market's growth.

One of the primary drivers of the polysilicon market is the rapid expansion of the solar photovoltaic industry worldwide. Governments and businesses across the globe are investing heavily in solar energy projects to achieve sustainability goals and reduce dependence on fossil fuels. This surge in solar installations, particularly in Asia Pacific, Europe, and North America, has propelled the demand for polysilicon, creating a robust market ecosystem.

The global polysilicon market exhibits a geographically diverse landscape, with key players and production hubs distributed across different regions. China, the United States, and Europe stand out as major contributors to the polysilicon market, housing prominent manufacturers and consumers of polysilicon.

China, in particular, has emerged as a dominant force in the global polysilicon market. The country's ambitious targets for renewable energy deployment, coupled with its position as the world's largest producer of solar panels, have led to a significant increase in polysilicon production capacity. Chinese polysilicon manufacturers have played a crucial role in meeting the growing demand for solar PV cells globally.

Europe, with its strong focus on clean energy initiatives and ambitious renewable energy targets, has also become a key player in the polysilicon market. European countries, such as Germany and Spain, have witnessed substantial investments in solar projects, further driving the demand for polysilicon.

The primary application of polysilicon lies in the solar photovoltaic industry, where it serves as a key material to produce solar cells. Polysilicon wafers act as the substrate for solar cells, capturing sunlight and converting it into electricity through the photovoltaic effect.

There are two main types of polysilicon used in solar cell production: multicrystalline and monocrystalline. Multicrystalline polysilicon is widely utilized due to its cost-effectiveness, while monocrystalline polysilicon offers higher efficiency in converting sunlight to electricity. Both types play a crucial role in meeting the diverse needs of the solar industry, catering to a range of solar panel technologies.

The solar photovoltaic industry's growth is further fueled by advancements in solar cell technologies, such as PERC (Passivated Emitter Rear Cell) and bifacial solar cells. These technologies enhance the efficiency of solar cells, driving the demand for high-quality polysilicon with improved purity and crystalline structure.

Several key trends and opportunities are shaping the polysilicon market, reflecting the industry's dynamic nature. Continuous advancements in manufacturing processes and technologies are enhancing the efficiency of polysilicon production. Improved methods for refining raw silicon and reducing impurities contribute to higher-quality polysilicon, aligning with the solar industry's demand for more efficient solar cells.

The ongoing trend towards sustainable and circular practices in the polysilicon industry is noteworthy. Manufacturers are exploring ways to reduce energy consumption and environmental impact during the production of polysilicon. Additionally, recycling initiatives for end-of-life solar panels are gaining traction, presenting opportunities for the development of a closed-loop system in the polysilicon value chain.

The increasing popularity of floating solar farms represents another significant trend in the polysilicon market. Floating solar installations on bodies of water offer multiple benefits, including reduced land use, enhanced cooling for solar panels, and increased energy yield. This trend has the potential to drive additional demand for polysilicon as floating solar projects become more prevalent globally.

While the polysilicon market experiences significant growth, it is not without its challenges. One notable challenge is the volatility of polysilicon prices. The market's sensitivity to factors such as global economic conditions, trade tensions, and changes in government policies can lead to price fluctuations, impacting the profitability of polysilicon manufacturers.

Overcapacity in the polysilicon market has been a historical challenge, particularly when supply exceeds demand. This scenario puts pressure on prices and profit margins, prompting manufacturers to optimize production capacity and explore new market opportunities.

The global polysilicon market stands at the forefront of the renewable energy revolution, playing a vital role in the expansion of the solar photovoltaic industry. As the world strives to achieve sustainability goals and transition towards cleaner energy sources, the demand for polysilicon is expected to remain robust.

The interconnection with the global Polysilicons market highlights the intricate relationships within the broader landscape of materials crucial to the renewable energy sector. The polysilicon market's growth is driven by technological advancements, government incentives, and the increasing adoption of solar energy worldwide.

Navigating challenges such as price volatility and overcapacity requires a strategic approach from industry stakeholders. Continuous innovation, sustainability initiatives, and strategic partnerships will be pivotal in ensuring the polysilicon market's resilience and continued contribution to the global shift towards a sustainable energy future.

Key Market Drivers

Growing demand for solar energy is Expected to Drive the Demand for Global Polysilicon Market

The global polysilicon market is poised for substantial growth, propelled by the growing demand for solar energy. Polysilicon, a critical raw material used in the production of solar photovoltaic (PV) cells, is witnessing increased demand as the world intensifies its focus on renewable energy sources. The solar energy sector, in particular, has emerged as a key driver for the polysilicon market, reflecting the global commitment to harnessing clean and sustainable power.

The surge in demand for solar energy is underpinned by several factors, including environmental concerns, government

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incentives, and advancements in solar technology. As nations strive to reduce their carbon footprint and transition towards cleaner energy alternatives, solar power has gained prominence as a viable and scalable solution. Polysilicon, a high-purity form of silicon, is a fundamental material in the production of solar cells, playing a central role in converting sunlight into electricity. The solar photovoltaic industry has experienced significant growth in recent years, driven by falling solar panel costs, increased efficiency, and supportive government policies promoting renewable energy. Polysilicon, being a key component in the manufacturing of solar cells, is witnessing heightened demand to meet the expanding capacity of solar installations globally. The photovoltaic market's growth is further accelerated by the decreasing cost of solar power, making it increasingly competitive with traditional energy sources.

Government initiatives and incentives, such as feed-in tariffs, tax credits, and subsidies, have played a pivotal role in fostering the adoption of solar energy. Many countries are actively promoting the deployment of solar power projects as part of their renewable energy targets and commitments to combat climate change. The increased adoption of solar energy systems, both at the utility and residential levels, drives the demand for polysilicon to produce the solar cells required for these installations.

Technological advancements in solar cell manufacturing, particularly in the development of monocrystalline and multi crystalline

Technological advancements in solar cell manufacturing, particularly in the development of monocrystalline and multi crystalline silicon solar cells, contribute to the rising demand for polysilicon. These advancements aim to enhance the efficiency and performance of solar panels, making them more attractive to consumers and businesses alike. Polysilicon, as the primary material for these high-efficiency solar cells, becomes crucial for achieving the desired outcomes in solar energy generation.

The global commitment to achieving sustainability goals, as exemplified by the Paris Agreement and various national initiatives, accelerates the adoption of renewable energy sources. Solar power, with its potential for decentralized generation and minimal environmental impact, aligns with these goals. Polysilicon, as an enabler of solar energy production, is at the forefront of the renewable energy transition, supporting the global shift towards a more sustainable and low-carbon energy landscape.

The demand for polysilicon is not only driven by utility-scale solar projects but also by the growing interest in distributed solar energy systems, rooftop solar installations, and off-grid solutions. As the awareness of the benefits of solar power spreads among businesses and consumers, the demand for polysilicon extends to a diverse range of applications, contributing to the decentralization of energy production and reducing dependence on traditional grid infrastructure.

In conclusion, the growing demand for solar energy is a key factor propelling the global polysilicon market's growth. As the world embraces renewable energy solutions to address environmental concerns and reduce reliance on fossil fuels, polysilicon plays a critical role in enabling the production of efficient and cost-effective solar cells. The solar photovoltaic industry's expansion, supported by government initiatives and technological advancements, drives the increased adoption of polysilicon, positioning it as a linchpin in the global effort to transition towards a sustainable and clean energy future.

Continuous Development of the Semiconductor Industry is Expected to Propel the Demand for Global Polysilicon Market Growth
The global polysilicon market is experiencing significant growth, driven by the continuous development and expansion of the
semiconductor industry. Polysilicon, a high-purity form of silicon, is a crucial raw material in the manufacturing of semiconductors,
which serve as the building blocks for electronic devices, integrated circuits, and advanced technologies. The relentless evolution
of the semiconductor industry, characterized by innovations in electronics, artificial intelligence, and communication technologies,
is a key factor propelling the demand for polysilicon on a global scale.

Semiconductors are fundamental components in a wide range of electronic devices, including smartphones, computers, automotive electronics, and industrial equipment. The demand for more powerful, energy-efficient, and compact electronic devices has led to continuous advancements in semiconductor technology. Polysilicon, as a primary material in the fabrication of silicon wafers, is essential for the semiconductor manufacturing process. These wafers serve as the substrate on which integrated circuits are built, and the quality of polysilicon directly influences the performance and efficiency of semiconductors.

The semiconductor industry's growth is fueled by several factors, including the proliferation of smart devices, the development of 5G technology, the Internet of Things (IoT), and the increasing digitization of various industries. As electronic devices become more sophisticated and diverse, there is a corresponding rise in the demand for high-performance semiconductors, driving the need for polysilicon. The continuous miniaturization of semiconductor components, as outlined by Moore's Law, also requires high-quality polysilicon to meet the exacting standards of semiconductor manufacturers.

Moreover, the automotive industry's shift towards electric vehicles (EVs) and the integration of advanced driver-assistance systems (ADAS) contribute to the demand for semiconductors and, consequently, polysilicon. EVs rely heavily on semiconductor

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components for power electronics, battery management, and control systems. The semiconductor content in vehicles is expected to increase with the evolution towards autonomous driving and the electrification of transportation, driving the demand for polysilicon as a critical input in semiconductor fabrication.

The continuous development of artificial intelligence (Al) and machine learning technologies further amplifies the demand for high-performance semiconductors. Data centers, used for processing and storage in Al applications, are powered by advanced semiconductor devices. The growing scale and complexity of data centers necessitate the use of cutting-edge semiconductor technology, underlining the importance of polysilicon in meeting the industry's stringent quality requirements.

Additionally, the global push towards 5G technology is a significant driver for the polysilicon market. The deployment of 5G networks requires advanced semiconductor components for base stations, antennas, and network infrastructure. The increased data speeds, lower latency, and connectivity improvements brought by 5G technology demand semiconductors with enhanced capabilities, intensifying the reliance on polysilicon for their production.

The geopolitical landscape, including trade dynamics and intellectual property considerations, also plays a role in shaping the polysilicon market. The semiconductor industry's growth is interconnected with global supply chains, and polysilicon is a critical link in ensuring a stable supply of semiconductors. Market dynamics, such as supply shortages or geopolitical tensions affecting trade, can impact the polysilicon market's trajectory and influence the semiconductor industry's overall expansion.

In conclusion, the continuous development of the semiconductor industry is a driving force behind the robust growth of the global polysilicon market. As the demand for high-performance semiconductors expands across various sectors, including consumer electronics, automotive, telecommunications, and industrial applications, polysilicon emerges as a foundational material enabling the advancement of semiconductor technology. The interconnectedness of technological advancements, market demands, and global supply chains underscores the pivotal role of polysilicon in supporting the continuous evolution of the semiconductor industry and powering the innovations that define the digital age.

Increasing Demand for Energy-Efficient Lighting Propels the Global Polysilicon Market Growth

The global polysilicon market is witnessing significant growth, driven by the increasing demand for energy-efficient lighting solutions. Polysilicon, a high-purity form of silicon, plays a pivotal role in the production of photovoltaic cells used in solar panels and, importantly, in the manufacturing of light-emitting diodes (LEDs). As the world transitions towards more sustainable and energy-efficient lighting options, the demand for polysilicon is rising to support the growth of the LED industry, contributing to a more eco-friendly and energy-conscious global lighting landscape.

LEDs have emerged as a preferred lighting technology due to their numerous advantages over traditional incandescent and fluorescent lighting. LEDs are known for their energy efficiency, longer lifespan, and lower environmental impact. Polysilicon is a critical material in the fabrication of LEDs, particularly in the production of wafers and substrates that form the basis of LED chips. The continuous development and adoption of LED technology for various lighting applications are driving the demand for polysilicon worldwide.

One of the key drivers for the increasing demand for energy-efficient lighting is the global focus on sustainability and environmental conservation. Governments, businesses, and consumers are increasingly recognizing the importance of reducing energy consumption and minimizing the carbon footprint. LEDs, which utilize polysilicon in their manufacturing, are highly energy-efficient, consuming significantly less electricity compared to traditional lighting technologies. As a result, the widespread adoption of LED lighting contributes to energy conservation and aligns with global efforts to mitigate climate change. The transition towards energy-efficient lighting is also influenced by regulatory initiatives and policies aimed at phasing out inefficient lighting technologies. Many countries have implemented regulations and standards that encourage the use of energy-efficient lighting solutions, such as LEDs, and discourage the use of traditional incandescent bulbs. These regulatory measures create a conducive environment for the growth of the LED industry, thereby boosting the demand for polysilicon as an essential component in LED production.

The commercial and residential sectors are witnessing a rapid shift towards LED lighting, driven by factors such as cost savings, improved lighting quality, and the desire for sustainable solutions. Polysilicon's role in the LED market extends to various applications, including general lighting, automotive lighting, and specialty lighting. The versatility of LEDs, coupled with the efficiency enabled by polysilicon, positions them as a versatile and sustainable lighting solution across diverse sectors. Furthermore, technological advancements in LED lighting, such as the development of smart lighting systems and connected

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lighting solutions, contribute to the expanding market for polysilicon. The integration of LEDs with smart technologies allows for energy-efficient lighting control, remote monitoring, and customization, enhancing both energy savings and user experience. Polysilicon's contribution to the semiconductor components within these advanced lighting systems underscores its importance in shaping the future of lighting technology.

The adoption of LEDs is not only limited to indoor and outdoor lighting but also extends to automotive lighting applications. As the automotive industry embraces LED technology for headlights, taillights, and interior lighting, the demand for polysilicon in LED manufacturing experiences an upsurge. The automotive sector's commitment to energy efficiency, safety, and innovative lighting designs further propels the integration of LEDs, driving the demand for polysilicon as a key material in this transformative process. In conclusion, the increasing demand for energy-efficient lighting, primarily driven by the widespread adoption of LEDs, is a major factor propelling the growth of the global polysilicon market. As the world seeks sustainable and eco-friendly lighting solutions, polysilicon emerges as a crucial component in the production of energy-efficient LEDs. The convergence of environmental awareness, regulatory support, technological advancements, and the growing preference for energy-efficient lighting collectively contributes to the expanding role of polysilicon in shaping the future of global lighting solutions.

Key Market Challenges

Competition from Other Materials Poses a Significant Obstacle to Market Expansion

Competition from other materials emerges as a substantial obstacle hindering the global expansion of the Polysilicon market. As a critical component in the production of solar cells and semiconductor devices, Polysilicon faces increasing competition from alternative materials vying for dominance in the renewable energy and electronics sectors. The relentless pursuit of more cost-effective and technologically advanced materials challenges the market share traditionally held by Polysilicon.

Silicon alternatives and emerging technologies, such as thin-film solar cells and organic semiconductors, intensify the competitive landscape. To surmount this obstacle, stakeholders in the Polysilicon market must invest in research and development, aiming to enhance efficiency, reduce production costs, and explore innovative applications. By staying at the forefront of technological advancements and demonstrating the unique advantages of Polysilicon, the industry can position itself strategically to overcome the challenges posed by competitive materials and foster sustained global market growth.

Supply Chain Disruption

Supply chain disruption presents a significant obstacle to the global expansion of the Polysilicon market, a key component in the production of solar cells and semiconductors. The intricate supply chain for Polysilicon involves raw material extraction, purification processes, and global distribution networks. Disruptions, whether caused by natural disasters, geopolitical tensions, or unexpected events like the COVID-19 pandemic, can severely impact the availability and cost of Polysilicon.

These disruptions ripple through the entire supply chain, affecting production timelines and escalating costs. To mitigate these challenges, stakeholders in the Polysilicon market must invest in resilient supply chain management, diversify sourcing strategies, and establish contingency plans. By enhancing supply chain flexibility and responsiveness, the industry can navigate uncertainties, ensuring a stable and consistent supply of Polysilicon. Proactive measures to address supply chain disruptions are crucial for sustaining market growth, meeting increasing demand for renewable energy technologies, and maintaining the Polysilicon market's global competitiveness.

Key Market Trends

Increasing Demand for High Purity Polysilicon

The global Polysilicon market is witnessing substantial growth, and a pivotal trend driving this expansion is the increasing demand for high-purity Polysilicon. As a critical raw material in the production of solar cells and semiconductors, high-purity Polysilicon plays a central role in the photovoltaic industry, which is experiencing unprecedented growth due to the global shift towards renewable energy. The demand surge is particularly evident in the solar energy sector, where Polysilicon is a key component in the manufacturing of solar panels. The push for cleaner and sustainable energy sources has led to significant investments in solar power projects globally, driving the demand for high-quality Polysilicon.

For example, the development and expansion of solar photovoltaic installations in emerging markets, such as India and China, contribute significantly to the increased demand for Polysilicon. These countries are experiencing rapid urbanization and a growing need for sustainable energy solutions, making high-purity Polysilicon a crucial component in their renewable energy strategies.

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Furthermore, advancements in technology and manufacturing processes have led to the production of Polysilicon with even higher purity levels, enhancing its efficiency in solar cell applications. The semiconductor industry also contributes to the heightened demand for high-purity Polysilicon as it is indispensable in the fabrication of integrated circuits and electronic devices. In conclusion, the increasing demand for high-purity Polysilicon, driven by the expanding solar energy market and semiconductor industry, stands out as a key trend shaping the growth trajectory of the global Polysilicon market. This trend not only reflects the global commitment to sustainable energy but also underscores the vital role of Polysilicon in advancing the renewable energy landscape and semiconductor technology.

Development of New Polysilicon Production Methods

The global Polysilicon market is undergoing significant growth, and a key trend steering this trajectory is the development of new production methods. Advances in technology and manufacturing processes are reshaping the polysilicon industry, impacting efficiency, cost-effectiveness, and environmental sustainability. One noteworthy example is the exploration of innovative methods for producing Polysilicon, such as the use of fluidized bed reactors and upgraded metallurgical-grade silicon (UMG-Si) as a feedstock. These emerging approaches aim to enhance the overall yield, reduce energy consumption, and lower production costs associated with traditional methods, contributing to the competitiveness of polysilicon in the market.

For instance, the fluidized bed reactor technology represents a more energy-efficient and environmentally friendly alternative to the conventional Siemens process. This method allows for continuous production, reducing the energy-intensive nature of batch processes. Additionally, the utilization of UMG-Si, which is a lower-cost raw material compared to electronic-grade silicon, is gaining traction. Although traditionally used in the metallurgical industry, advancements in purification processes enable the conversion of UMG-Si into high-purity Polysilicon suitable for solar applications.

These innovative production methods align with the broader industry goals of sustainability and cost optimization. As the demand for Polysilicon continues to rise, driven by the growth in solar energy and semiconductor markets, the development of new production methods becomes a crucial factor in meeting global needs. Companies investing in and adopting these advancements are poised to not only improve their competitiveness but also contribute to the ongoing evolution of the global Polysilicon market. Segmental Insights

End User Industry Insights

Based on the end user industry, the Solar PV segment established its dominance in the global market for Polysilicon based on the application. The dominance of the Solar PV (Photovoltaic) segment in the global market for polysilicon is clear, and the statistics from 2021 reinforce its unparalleled position. According to the International Renewable Energy Agency (IRENA), solar power remains the fastest-growing renewable energy source worldwide, constituting over half of the 3,064 GW of renewable capacity installed in 2021. This growth is particularly pronounced in the Solar PV sector, where the total global solar capacity expanded by an impressive 19%, resulting in an additional installation of 133 GW.

In 2021, solar and wind power collectively contributed to over 10% of the total electricity generated globally for the first time, with solar power alone accounting for approximately 5% of this share, according to the World Economic Forum. The overall installed global solar energy capacity reached around 850 GW, showcasing a substantial increase from the previous year's 770 GW. The International Energy Agency (IEA) attributes a significant portion of the surge in renewable power capacity in addition to the commissioning of 290 GW of new solar PV installations in 2021, representing a 3% increase from 2020. Notably, Solar PV emerged as the dominant force, accounting for more than half of the total expansion in renewable power capacity during this period. These statistics underscore the Solar PV segment's commanding position in the global polysilicon market. The remarkable growth in solar capacity installation, coupled with its increasing contribution to the overall electricity generation mix, solidifies Solar PV as the primary end-user industry driving the demand for polysilicon. As the world intensifies its shift towards cleaner and sustainable energy solutions, the Solar PV segment is poised to maintain and strengthen its dominance in the global polysilicon market in the foreseeable future.

Regional Insights

Based on the Region, Asia Pacific region emerged as the dominant player in the global Polysilicon market in 2022, holding the largest market share in terms of both value and volume. The Asia-Pacific region has emerged as a significant consumer of polysilicon, driven by increasing demand from key nations including China, South Korea, and India. Notably, China has recently disclosed a total polysilicon production capacity of 122,000 tons, with substantial plans for new expansions. The country is

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anticipated to bring over 1.2 million tons of additional capacity online by 2023, primarily outside of Xinjiang, although a substantial majority 89% of global polysilicon production is expected to remain within China.

South Korea, ranking as the ninth-largest global solar installation hub, generates around 4% of its electricity from solar energy. Notably, the country has committed to carbon neutrality by 2050, with an interim goal of reducing emissions by 40% by 2030, according to the International Trade Organization. Despite importing more than 90% of its energy resources, South Korea displayed a notable increase in renewable energy, contributing to an 18% rise in electricity generation from renewable sources in 2021.

In 2021, Tata Power Solar secured substantial orders valued at USD 65.77 million from Energy Efficiency Services Ltd (EESL) in India. These orders are earmarked for the development of multiple distributed ground-mounted solar projects with a cumulative capacity of approximately 100MW.

India and China host some of the world's largest solar power facilities, with the Bhadla solar farm in Rajasthan, India, boasting a remarkable total production capacity of 2,245 megawatts as of June 2021. Given these trends and the burgeoning end-user base, the demand for polysilicon in the Asia-Pacific region is expected to witness a substantial boost during the forecast period.

Key Market Players

Wacker Chemie AG

Asia Silicon (Qinghai) Co. Ltd

Dago New Energy Co. Ltd

Hemlock Semiconductor Operations LLC And Hemlock Semiconductor LLC

Mitsubishi Polycrystalline Silicon America Corporation

OCI Company Ltd

Qatar Solar Technologies

REC Silicon ASA

Sichuan Yongxiang Co. Ltd (Tongwei)

Tokuyama Corporation

Report Scope:

In this report, the Global Polysilicon Market has been segmented into the following categories, in addition to the industry trends which have also been detailed below:

? Polysilicon Market, By End User Industry:

o∏Solar PV

?[]Monocrystalline Solar Panel

? Multi crystalline Solar Panel

o∏Electronics

?⊓Semiconductor

o[Others

?[Polysilicon Market, By Region:

o

☐North America

? United States

?[Canada

?∏Mexico

o∏Europe

?[France

? United Kingdom

?∏Italy

?∏Germany

?[|Spain

o∏Asia-Pacific

?[China

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?[Colombia

o∏Middle East & Africa

?∏South Africa

?∏Saudi Arabia

?∏UAE

?∏Kuwait

?[Turkey

?[Egypt

Competitive Landscape

Company Profiles: Detailed analysis of the major companies present in the Global Polysilicon Market.

Available Customizations:

Global Polysilicon market report with the given market data, Tech Sci Research offers customizations according to a company's specific needs. The following customization options are available for the report:

Company Information

? Detailed analysis and profiling of additional market players (up to five).

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