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DECEMBER 2025

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DECEMBER 2025

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EXECUTIVE SUMMARY

SOLAR PHOTOVOLTAICS

Installed photovoltaic (PV) capacity has grown over tenfold in the last decade, led by China (51% of growth), Europe (15%), and the USA (9%). In this time period, silver demand in PVs has risen threefold; the rise has not been proportional to capacity due to technological 'thrifting' reducing silver required per cell. The future outlook for PV's remains strong with the International Energy Agency (IEA) expecting that solar energy will become the dominant renewable energy source globally by 2030. Solar capacity is forecast to grow at 17% compound annual growth rate (CAGR) to 2030. This strong outlook is supported by many governments setting ambitious solar capacity goals with supportive funding although recent U.S. subsidy cuts and trade tariffs are likely to negatively impact solar module costs. However, with experts believing that solar costs will continue to fall, solar power is increasingly become cost competitive independent of government support.

Although technological advancements have reduced silver requirements per cell, new next-gen solar cells (TOPCon, SHJ) require more silver, offsetting reductions. However, significant developments in copper plating technologies have occurred which will reduce the silver requirement of a solar cell. While these technologies currently make up a minimal portion of world sales, experts believe that these will increase significantly in years to come.

AUTOMOTIVE AND ELECTRIC VEHICLES

The shift to electric vehicles (EVs) accelerated after the covid pandemic with the global EV market rapidly expanding from a niche subsector of the automotive industry to a large-scale market. Generous incentives supported the shift to EVs while stringent emission regulation has also played a part in areas like Europe. However, in more recent years, the removal of government incentives, increased tariffs and concerns around range anxiety has contributed to waning EV demand. However, we expect the transition to greater EV market penetration to continue over the long-term forecast horizon with global EV production forecast to grow at a CAGR of 13% between 2025 to 2031.

The shift from internal combustion engine vehicles (ICEs) to EVs is expected to boost silver demand considerably; EVs, especially battery electric vehicles (BEVs), consume on average 67-79% more silver than ICEs. Overall, we forecast global silver demand by the automotive industry will increase at a CAGR of 3.4% between 2025-2031. The rapid increase in EV demand and production means that EVs are forecast to overtake ICEs as the primary source of silver demand by the automotive industry by 2027 and they will account for 59% of the share by 2031. In addition, electrifying the automotive industry boosts silver demand through the parallel need to build out charging infrastructure.

Finally, the growing sophistication of vehicles is expected to boost silver demand in EVs and the broader automotive sector. Technological advancements have led to a rising number of safety features and features for passenger comfort (such as rearview cameras, sensors, and smart displays) which is further increasing silver demand. The move towards autonomous driving is also likely to further boost silver demand through the increased need for sensors.

DATA CENTRES AND ARTIFICAL INTELLIGENCE

Data centres are the backbone of the digital economy. They provide the physical infrastructure needed to run cloud computing services, store and manage data, and, increasingly, power artificial intelligence (AI) systems. As digitalisation and AI adoption accelerate, so too does the demand for critical materials involved in their applications— silver a critical one among them. We estimate that total global IT power capacity grew by an estimated 53x, from 0.93 GW in 2000 to nearly 50 GW in 2025. Even in the absence of precise silver loading data, the link is clear: a 5,252% increase in IT power means more computing hardware and more demand for silver.

Governments worldwide are prioritizing data centres as critical infrastructure, rolling out policies that streamline regulation and provide incentives such as grants, tax breaks, and fast-track approvals. Initiatives in the US, UK, EU, and China aim to attract large-scale private investment, reduce barriers, and expand capacity to meet rising AI and cloud demand—ultimately driving growth in materials like silver.

Looking forward, accelerating digitalisation and the widespread uptake of artificial intelligence are expected to continue gathering pace, placing growing demands on digital and physical infrastructure. As AI applications diversify into media production, design, and simulation, demand for compute (servers' processing power) and, by extension, data centre infrastructure is expected to continue growing.[1] Moreover, AI applications increasingly rely on specialised hardware such as graphics processing units (GPUs), tensor processing units (TPUs), and neural processing units (NPUs), all of which depend on high-performance semiconductors that use silver in their internal connections and packaging. Lastly, the broader electronics supporting AI integration—ranging from autonomous vehicles and robotics to edge computing devices—requires silver-rich components.

[1] In data centres, *compute* represents the servers' processing power — the hardware and software resources that execute applications, process data, and support AI and cloud services.

INTRODUCTION

Silver is poised to play a pivotal "next generation metal" role across industries critical to the green energy transition and digital transformation over the coming decade. Silver's unique properties make it an indispensable component in their development and expansion. Perhaps its most important property is that it has the highest electrical conductivity of any metal. This property is critical for many industries; it enhances energy conversion in solar panels; accelerates data processing in data centres; and enables rapid charging and efficient power transmission in electric vehicles. Silver also has excellent thermal conductivity (it is more thermally conductive than copper, aluminium or bronze) and has high corrosion resistance. These properties prevent overheating and performance losses and help to prolong operational performance.

This report reviews silver's role in three industries which will shape the future; Photovoltaics, Automotive and Electric Vehicles and Data Centres and Artificial Intelligence. For each sector we examine:

i. The relevance of silvers properties for use in application.
ii. Silver loading and expected future silver demand.
iii. How technological advancements and government policy is expected to influence the sector.

1. SOLAR PHOTOVOLTAICS

1.1 RELEVANCE OF SILVERS PROPERTIES FOR USE IN APPLICATION

Solar cells allow sunlight to be converted into electricity. A typical solar cell contains a conductive silver paste on its front and back. Silver's use in photovoltaics stems from three core properties of the metal:

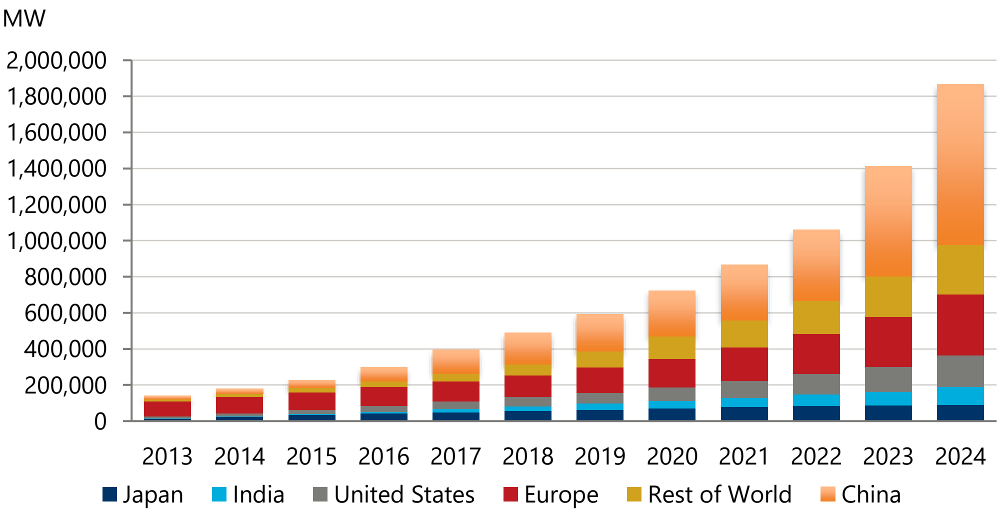
(1) **Highest electrical conductivity**: This is the most essential quality for PVs' as it enables electricity to be carried and stored efficiently, maximising the energy output of the solar cell.
(2) **Excellent thermal conductivity:** This enables heat dissipation generated during sunlight absorption, preventing performance losses.
(3) **High corrosion resistance:** Supports longevity and performance under harsh environmental conditions (e.g temperature swings, moisture, UV).

This chapter will examine the outlook for silver usage in photovoltaics by examining both the growth trajectory of PVs and how technological developments are expected to influence the amount of silver required in PVs.

1.2 SILVER LOADING/DEMAND

In the past decade, installed photovoltaic power capacity has increased more than tenfold. Global demand for photovoltaics has primarily come from China, with China making up 51% of the global increase in installed photovoltaic capacity in the last 10 years. This is followed by Europe (15% of global contribution) and the United States (9% of global contribution).

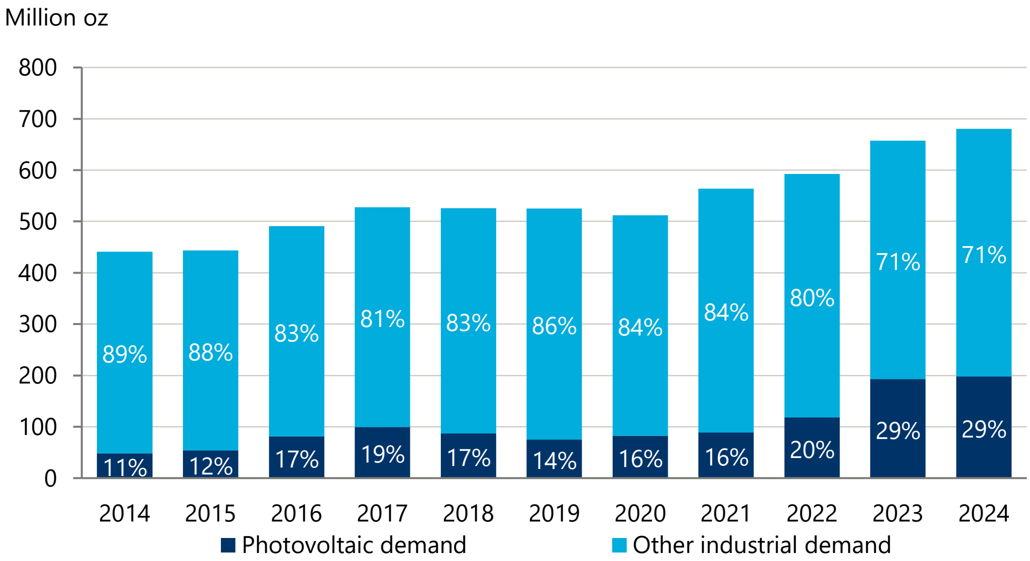
Fig. 1. Global added photovoltaic capacity, 2014-2024, MW



Source: IRENASTAT

The large growth in photovoltaic installations in the past decade means that silver demand from photovoltaics has grown faster than demand from other industrial uses (e.g., demand for other electricals and alloys). As such, silver demand from PVs now makes up a higher proportion of overall industrial demand for the metal than it did 10 years ago. Silver demand for photovoltaics now makes up 29% of total industrial demand, while in 2014 it only make up made up 11% (Fig. 2). However, while photovoltaic installations are over tenfold higher than 10 years ago, silver demand from photovoltaics is only threefold higher, reflecting technological developments that have reduced the amount of silver required in PV cells.

Fig. 2. Industrial Demand for Silver, 2014-2024



Source: World Silver Survey

1.3 EXPECTED FUTURE SILVER DEMAND

The future growth trajectory of PV's continues to be very strong. In their latest Renewables Market Report the International Energy Agency (IEA) expect that new solar capacity added between now and 2030 will account for more than 80% of the growth in renewable power globally. As such, the average annual growth (CAGR) in global solar capacity is expected to be 17% between now and 2030.[2] This rapid growth means that by 2030, the IEA expect solar PV will become the foremost renewable electricity source.[3]

However, the Silver Institute's 2025 World Silver Survey forecasts that in 2025 demand from silver through PVs will decline as the amount of silver required in PV cells will outweigh projected gains in cell production. This is a result of technological advances that allow for thrifting.

[2] IEA Renewable Energy Progress Tracker. Accessed July 2025.
[3] International Energy Agency, Renewables 2024.

1.4 IMPACT OF GOVERNMENT POLICY AND TECHNOLOGICAL ADVANCEMENTS

1.4.1 GOVERNMENT POLICY

Strong expected growth in the PV sector is underpinned by ambitious government targets and support schemes. For example, as part of their EUPowerEU plan, the EU aims to deliver at least 700 GW of solar capacity by 2030; to achieve this target solar capacity would have to increase by 13% annually.[4] Although most of the financing of this increase will be private, the European Union will be providing tens of billions of euros funding through various instruments.[5] India also has an ambitious target of 500GW of installed solar capacity by 2030. Meeting this target requires capacity expansion of 37% a year. Government initiatives that provide both financial incentives and regulatory support will be key to meeting this goal.

However, several recent government policy developments weigh on the future outlook of photovoltaics. In July 2025, US President Donald Trump signed an executive order to eliminate subsidies for green energy sources including solar. However, despite this, solar projects in many American states are expected to continue to be profitable because of strong solar resource potential as well as strong local incentives.[6] Oxford Economics latest forecasts suggests that solar electric power generation in the US will grow at an average annual rate (CAGR) of 14% between now and 2030. The rapid expansion of data centres in the US is expected to support this growth; data centres are highly electricity intensive. (See Section 3 for more details).

Another risk to the future outlook is increased protectionism. In recent months both the EU and US have imposed additional import tariffs and antidumping duties on solar PV units which are mostly manufactured in China. This will push up the cost of producing solar energy and negatively impact future demand.

1.4.2 TECHNOLOGICAL ADVANCEMENTS

1.4.3 Falling cost of Solar Energy

The global weighted average levelized cost of electricity (LCOE) of utility-scale solar PV plants is now 90% lower in 2023 than in 2010.[7] This rapid cost reduction now means that electricity produced from solar is cost competitive with electricity produced from fossil fuel sources. The IEA estimate that 96% of newly installed, utility solar PV and onshore wind capacity had lower generation costs than new coal and natural gas plants.[8] Cost reductions in solar PV have been driven by substantial Chinese investment in solar manufacturing capabilities (China's share in manufacturing across the solar panel supply chain now exceeds 80%).[9] Looking forward, experts believe that solar costs will continue to fall

[4] European Commission. Solar Energy
[5] European Union,2022. EU Solar Energy Strategy
[6] Landgate. The Impact of the Big Beautiful Bill on Renewable Energy.
[7] International Renewable Energy Agency, 2024. Renewable Power Generation Costs in 2023.
[8] International Energy Agency. Renewables 2023
[9] International Energy Agency, Solar PV Global Supply Chains.

with BloombergNEF forecasting that's PV LCOE's will fall by a further 31% from today to 2035.[10] Continued expected cost reductions in the cost of solar power will ensure the long-term competitiveness of PV power generation independent of government support.

1.4.4 Silver Thrifting and next generation solar cells

Given that silver makes up between 5-10% of a PV modules manufacturing cost, manufacturers have a significant incentive to develop new PV models with a reduced silver content.[11]

Although silver thrifting provides an opportunity for lower fuel consumption, next generation n-type Tunnel Oxide Passivated Contact (TOPCon) and Silicon heterojunctions (SHJ) solar cell technologies have substantially higher silver requirements. Considerably more efficient than PERC cells (the existing industry standard), this new generation of solar cells is now the dominant cell architecture. According to the latest International Technology Roadmap for Photovoltaics (ITRPV), published by the German Mechanical Engineering Industry Association (VDMA), in 2024 sales of TOPCon cells exceeded Passivated Emitter and Rear Cells (PERC) for the first time.[12] TOPCon currently consumes about 50% more silver than PERC, but silver consumption rates of next generation cells are expected to drop over time as the technology develops. However, the latest ITRPV report expects that in 2035 levels of silver consumption for these new generation cells will still be higher than existing silver requirements for PERC cells, the solar cells most commonly used today.

1.4.5 Recycling and alternative materials

Although there is significant potential to recover silver from PV modules, experts believe that recycled silver can only make a marginal contribution to the silver supply for PVs in the near term.[13] Rapid expected growth rates of the PV industry coupled with a 25-year PV module lifetime means that recycling rates would have to increase considerably to materially impact silver supply. At present, the recycling industry for PVs is still very small as very few PVs are currently reaching the end of their lifespans.

Regarding the use of alternative metals, research is ongoing with respect to using cheaper substitute metals such as copper and aluminium in solar PVs. Challenges with using these materials in place of silver include reduced efficiency and reliability of PV cells. However, there have been some significant developments in the area in recent years, with silver coated copper powder now being used in PV manufacturing. The use of silver coated copper powder reduces the conversion efficiency by <1% while reducing silver consumption by 30-50%. Moreover, although other techniques such as copper

[10] BloombergNEF, 2025. Global Cost of Renewables to Continue Falling in 2025 as China Extends Manufacturing Lead: BloombergNEF

[11] Hallam,B, Kim,M. .,Zhang,Y.,Wang,Li.,Lennon A., Verlinden,P.,Altermatt,P.,Dias,P. The silver learning curve for photovoltaics and projected silver demand for net-zero emissions by 2050. Wiley. Research Article.

[12] VDMA. 16th Edition, May 2025. International Technology Roadmap for Photovoltaics (ITRPV). 2024 results

[13] Hallam,B, Kim,M. .,Zhang,Y.,Wang,Li.,Lennon A., Verlinden,P.,Altermatt,P.,Dias,P. The silver learning curve for photovoltaics and projected silver demand for net-zero emissions by 2050. Wiley. Research Article.

plating technologies currently makes up a minimal portion of world sales, experts believe that this will increase significantly in years to come.[14]

[14] VDMA. 16th Edition, May 2025. International Technology Roadmap for Photovoltaics (ITRPV). 2024 results

2. AUTOMOTIVE AND ELECTRIC VEHICLES

2.1 RELEVANCE OF SILVERS PROPERTIES FOR USE IN APPLICATION

Silver is a key manufacturing input in automotive components due to its superior properties of high electrical conductivity and ductility. Silver has been used by the automotive industry for many years and there has been a steady increase in the use of electrical and electronic components driven by demand for enhanced safety features and improved functionality for passenger comfort. Over more recent years, the electrification of the automotive industry and rising prevalence of electric vehicles is likely to further boost silver demand from the automotive industry.

Silver's use in automotives and electric vehicles stem from three core properties of the metal:

(1) **Highest electrical conductivity**: This ensures efficient power transmission throughout the vehicle's electrical systems, including battery packs, inverters, and charging modules. This efficiency leads to reduced energy loss, faster charging times, and enhanced overall performance.
(2) **Excellent thermal conductivity:** The use of silver in components such as batteries, power electronics and motors ensures optimal performance by preventing overheating and degradation.
(3) **High corrosion resistance:** Implementation of corrosion-resistant materials helps maintain vehicle safety and performance.

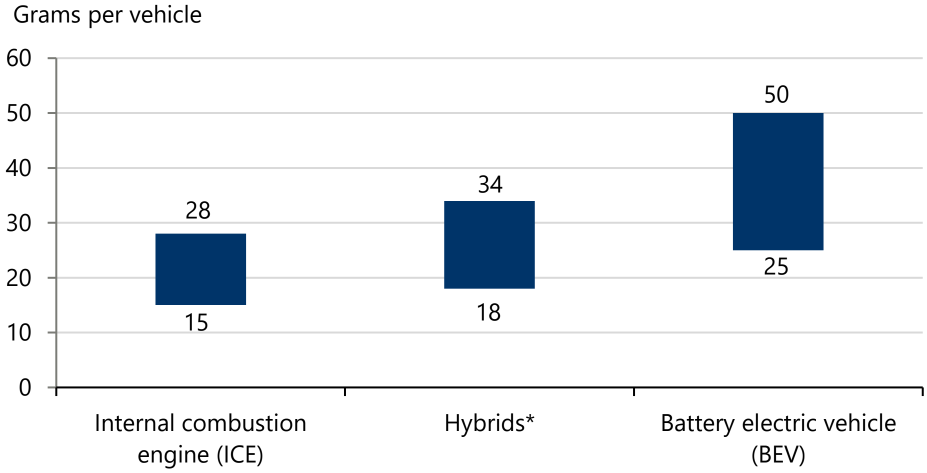
This chapter will look more closely at the role of silver in the automotive sector, with particular focus given to the shift to electric vehicles. We use our automotive forecasts to analyse how silver usage will evolve out to 2031.

2.2 SILVER LOADING/DEMAND

Silver's superior properties have allowed it to remain a key part of the production process for automotive components, but its wide range of uses in light vehicle production means that it is difficult to know exactly how much silver demand comes directly and/or indirectly from the automotive industry. For instance, the automotive industry is responsible, in part, for the demand for electronic and electrical components as well as silver brazing alloys used for joining metal parts together, like those present in a vehicle's exhaust system. These two areas are captured as primary consumers of industrial silver demand in the 2025 World Silver Survey.

However, the intensity of silver usage in light vehicle production has grown over past decades as the need for enhanced safety features and functionality to improve driving experiences has required a larger number of electronic control units (ECUs). According to a 2021 report from the Silver Institute, there were approximately 150-250 electrical contacts within a typical light vehicle, and we expect this estimate has likely grown in line with the trend of automotive electrification.[15] Estimates of silver consumption by powertrain type show that the amount of silver used in the production of full hybrids and BEVs is higher than ICEs. This reflects the need to have battery management systems in hybrid vehicles and especially in EVs. While the upper and lower bounds of silver consumption by powertrain are wide, the estimates suggest that BEVs at the lower bound consume 67% more silver than ICEs and 79% more at the upper bound (Fig. 3).

Fig. 3. Upper and lower bounds of per vehicle silver consumption by powertrain type



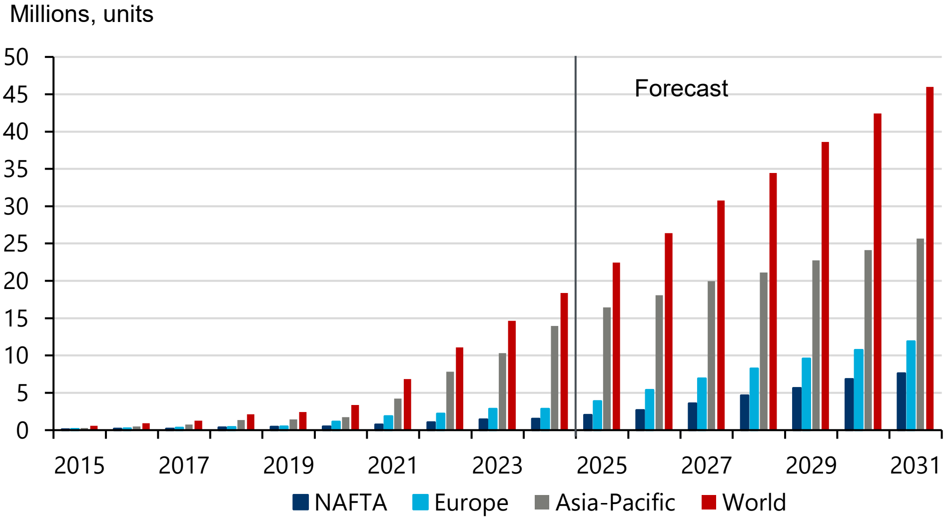
*Full hybrids
Source: The Silver Institute

2.3 GLOBAL PRODUCTION OUTLOOK FOR ELECTRIC VEHICLES

The shift to EVs accelerated after the pandemic with the global EV market rapidly expanding from a niche subsector of the automotive industry to a large-scale market. EV's made up 21% of light vehicle production in 2024 (in unit terms), up from 3% in 2019. Generous incentives supported the shift to EVs while stringent emission regulation has also played a part in areas like Europe. In more recent years, however, the removal of government incentives and persistent concerns around range anxiety has contributed to waning EV demand, although we expect the transition to greater EV market penetration to continue over the long-term forecast horizon. We expect that global EV production will grow at a CAGR of 13% between 2025 to 2031.

[15] The Silver Institute. Silver's growing role in the automotive industry.

Fig. 4. Global EV production outlook from 2025-2031



Note: Plug-in hybrids classed as EVs

Source: Oxford Economics/GlobalData

At a regional level, light vehicle EV production has been led by Asia-Pacific with production in Europe and the NAFTA region far behind (Fig. 4). Asia-Pacific accounted for 76% of global EV production in 2024, while Europe and the NAFTA region accounted for 16% and 8%, respectively. It is important to note that almost all Asia-Pacific growth has been driven by Chinese EV production, which made up 91% of Asia-Pacific EV production in 2024.

Over the forecast period from 2025-2031, we expect growth to pick-up in Europe and North America, which will reduce Asia-Pacific's share of global EV production. Asia-Pacific's share of global EV production is forecast to decline to 56% by 2031 as Europe and the NAFTA region see an increase to 26% and 17%, respectively. Despite relatively slower growth, however, the larger production base in the Asia-Pacific region (mainly China) means that it will still be the main driver of global EV production growth over the forecast period, contributing 39% of the growth compared to 34% by Europe and 24% by the NAFTA region.

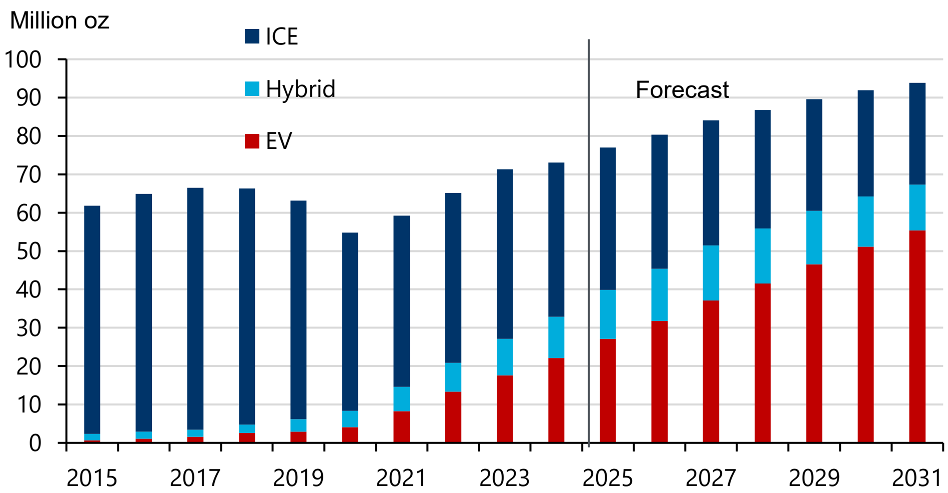
2.4 EXPECTED FUTURE SILVER DEMAND

The continued shift towards automotive electrification, the large per vehicle consumption of silver in BEVs (relative to hybrids and ICE vehicles), and higher demand for ECUs within light vehicles, more generally, points to a healthy outlook for silver demand by the automotive industry.

To estimate total silver demand by the automotive industry, we used the simple averages of per vehicle silver consumption by powertrain (Fig. 3) and multiplied these by our light vehicle unit production data across the ICEs, hybrids and EVs segments. As a check, we also compared our 2021 estimate against that found in the report 'Silver's growing role in the automotive industry' published by the Silver Institute and found that our estimate of 1843 metric tons is only 3% lower than the 1900 metric tons noted in the 2021 report.

Overall, we forecast global silver demand by the automotive industry will increase at a CAGR of 3.4% between 2025-2031 (Fig. 5) and reach approximately 94 million ounces 2031. In 2024, ICE vehicles accounted for 55% of silver demand with EVs in second place at 30%. The rapid increase in EV demand and production means that the production of EVs are forecast to overtake ICEs as the primary source of silver demand by the automotive industry by 2027 and they will account for 59% of the share by 2031.

Fig. 5. The outlook for silver demand by the automotive industry from 2025-2031



Source: Oxford Economics/GlobalData/The Silver Institute

While the electrification of the automotive industry is clearly supportive of silver demand, there are some caveats to keep in mind regarding the estimates of global silver demand. Firstly, the upper and lower bands of silver consumption by powertrain type were large, and this therefore means that our global silver demand estimates could be skewed upwards or downwards. Furthermore, we assume that these averages do not change over time, but it is likely that they do increase over time as the number of electronic functions in a vehicle increase, while the move towards autonomous driving could further boost the need for sensors and ECUs. On the other hand, there have been efforts to reduce multiple ECUs into a single domain control unit which could dampen silver demand over the forecast horizon. On balance, we expect the transition to EVs to boost silver demand, particularly through the increasing use of electrical and electronic components.

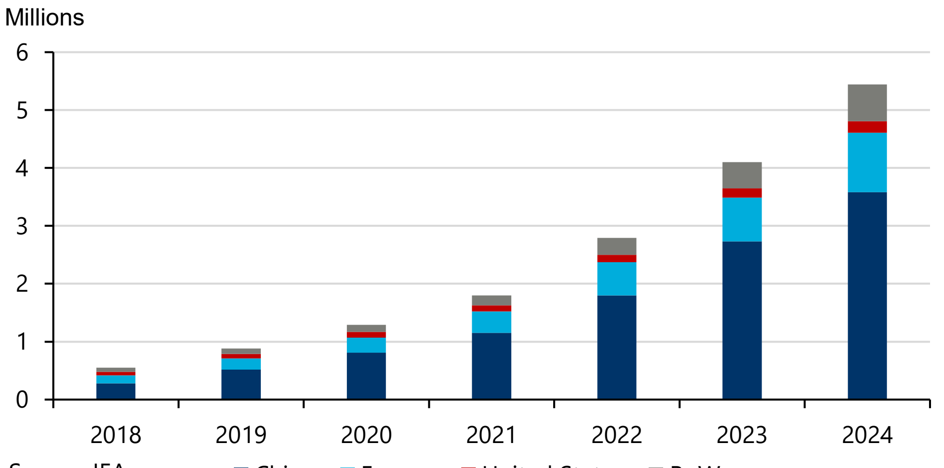
BOX 1: IMPORTANCE OF EV CHARGING STATIONS FOR SILVER DEMAND

The added benefit to silver demand from electrifying the automotive industry is the corresponding requirement to establish charging infrastructure.

Charging stations use silver in their electrical contacts because it offers exceptionally high electrical and thermal conductivity, and also resists oxidation and corrosion from environmental exposure, which helps protect the components. For instance, Wissenergy, a supplier of EV charging equipment highlights that EV charging cables that use multi-strand copper wire are often silver-plated to balance everyday use against high-conductivity and rust protection[16].

According to the IEA, the global stock of public charging points increased by 33% in 2024 (Fig. 6). Approximately 21 percentage points of the increase was accounted for by China, 7 percentage points by Europe and just 1 percentage point by the US. The IEA's estimates suggest that there is 1 public charger for every 10 EVs in China while the EU has 1 public charger for every 13 EVs.

Fig. 6. Global stock of public charging points by region



Source: IEA

We expect that the predicted rise in EV adoption will require adequate EV charging infrastructure, which will in turn boost demand for silver over the forecast horizon.

2.5 IMPACT OF GOVERNMENT POLICY AND TECHNOLOGICAL ADVANCEMENTS

2.5.1 GOVERNMENT POLICY

Regarding domestic EV policy incentives China maintains its generous incentives although certain subsidies are being phased down. The government continues to offer subsidies if consumers trade-in

[16] Wissenergy. What are EV charging cables made of?

older ICE vehicles. The scrappage and renewal policy has been extended and strengthened, continuing until December 2025, while the EV purchase tax subsidy policy will continue albeit with a less generous exemption from 2026. Additional favourable policies including reducing downpayment requirements for automotive financing loans and gradually easing restrictions on EV purchases from different regions.

However, countries such as the US are rolling back on incentives. President Trump's anti-EV campaign has led to policy changes that we expect will slow, but not prevent, continued EV production growth over the forecast period. As part of the major tax-and-spending package, known as the One Big Beautiful Bill, the Trump administration rolled back EV tax credits introduced under the Inflation Reduction Act, reducing incentives for EV adoption. The $7500 tax credit for new EV purchases and $4000 tax credit for used models ended on 30th September 2025. President Trump's anti-EV policies led to the federal government instructing state officials to halt spending on charging infrastructure via the $5 billion National Electric Vehicle Infrastructure program. Canada is also pausing or reducing certain incentives for low emission vehicles, although there is more emphasis on funding EV infrastructure (e.g. charging stations).

The imposition of import tariffs around the world will increase prices and reduce affordability, which is likely to dampen the growth of electric vehicles. For example, the EU raised tariffs against Chinese BEV imports (ranging from 17.8% to 45.3%) in late 2024 and the US has placed widespread tariffs on automotives; imports from Canada face a tariff of 25% whilst imports from Europe face 15% tariff. With 45% of all US car sales from imports, the tariffs will have major cost implications, reducing demand. Increased tariffs on automotive parts also has negative implications for the sector with the increased imposition of tariffs globally expected to reduce affordability. The automotive sector is typically highly dependent on globalised supply chains, with auto parts often crossing borders multiple times before final assembly.

2.5.2 TECHNOLGICAL ADVANCEMENTS

2.5.3 Automotive electrification and silver thrifting

Technical developments in the BEV market mean that silver usage per BEV is lower than once expected. However, reductions are being outweighed by the increased sophistication of vehicles.[17] Initially, silver was used primarily in components like switches to control basic electronic devices like highlights, wipers and conductive lines that are placed in automotive glass to defrost vehicle windows. However, technological advancements have led to a rising number of safety features and features for passenger comfort (such as heated car seats) which is increasing silver demand. Safety systems include anti-lock brake technology, and an increasing number of vehicles are equipped with sensors and cameras to support drivers.

[17] World Silver Survey, 2025.

3. DATA CENTRES AND ARTIFICIAL INTELLIGENCE

3.1 RELEVANCE OF SILVERS PROPERTIES FOR USE IN APPLICATION

Data centres are the backbone of the digital economy. They provide the physical infrastructure needed to run cloud computing services, store and manage data, and, increasingly, power artificial intelligence systems.[18] As digitalisation and AI adoption accelerate, so too does the demand for critical materials involved in their applications— silver a critical one among them.

Within this infrastructure, silver plays a vital and irreplaceable role. The metal is used across multiple components.[19]

Silver's use in data centres stems from three core properties of the metal:

(1) **Highest electrical conductivity:** Silvers highest conductivity ensures minimal power loss across connectors and circuits. This is particularly important for servers housed in data centres, which are high electricity dense, and operate on 99.999% critical uptime.

(2) **Excellent thermal conductivity:** In data centres, where thermal management is a major energy burden,[20] silver-based thermal materials help keep equipment operating within safe temperature ranges and reduce cooling energy demands.

[18] A data centre is a facility that houses the computing infrastructure required to process, store, and transmit data. This includes servers, network equipment, power distribution units, and specialised cooling systems. These centres operate around the clock to ensure constant connectivity for business applications—such as cloud storage, email servers, and databases—and for consumer-facing services like social media, e-commerce, and video streaming. Data centres are also essential to the AI ecosystem, supporting both the training of large language models and the execution of real-time inference tasks.

[19] This includes: Electrical contacts: silver or silver-alloy contacts are found in circuit breakers, switches, and relays, ensuring efficient and reliable function under high load. Cabling and connections: silver-plated connectors enhance conductivity in power and fibre-optic systems while resisting oxidation. Semiconductors: silver-based solders and adhesives are widely used in attaching semiconductor chips within servers and GPUs. Cooling systems: silver's thermal properties are harnessed in heat sinks and thermal interface materials to dissipate heat from high-density electronics.

[20] The share of cooling systems in total data centre consumption varies from about 7% to 30% depending on the efficiency of the data centre International Energy Agency, Energy Demand from AI, accessed July 2025.

(3) **High corrosion resistance:** This is crucial in data centres where high electrical loads and temperature fluctuations could degrade other materials.

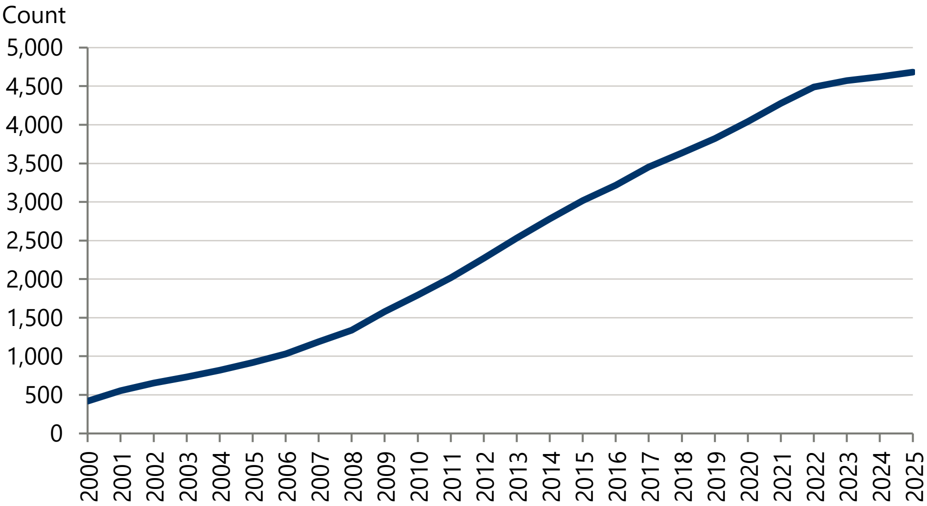
This chapter investigates the future growth in data centres and AI and what this means for silver demand.

3.2 SILVER LOADING/DEMAND

3.2.1 Global data centre landscape

The surge in data consumption and adoption of AI technologies, has driven a rapid increase in data centre construction globally. We have gathered data on the stock of data centres globally which we have used to chart the rapid growth in data centre construction and their geographical distribution.[21] We estimate that the number of data centres worldwide has grown elevenfold since 2000, there are over 4,600 data centres today globally (Fig. 7).

Fig. 7. Global stock of data centres, 2000-2025



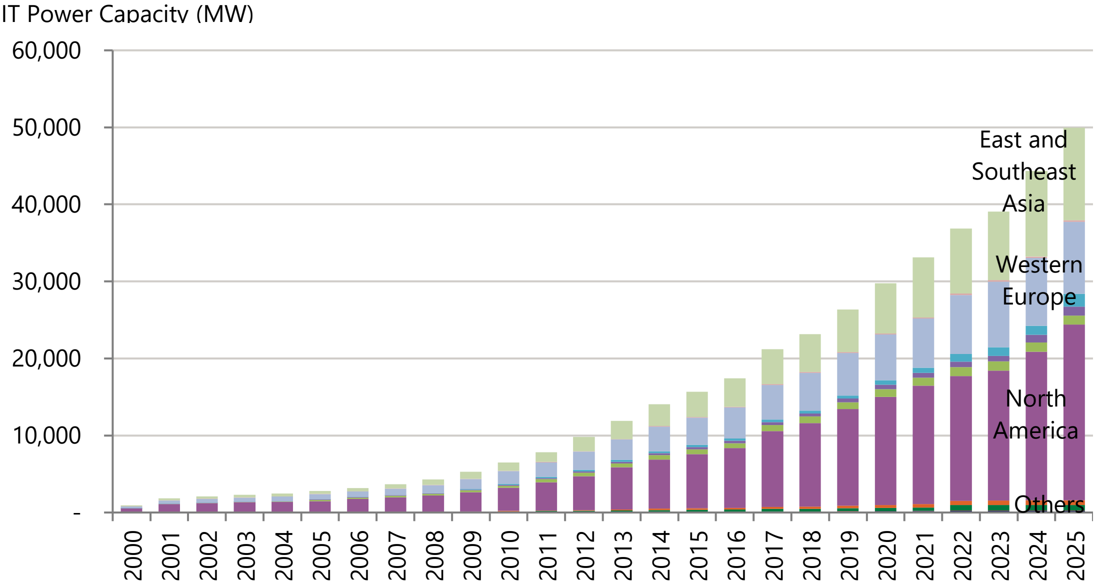
Source: DCByte/Oxford Economics

However, a simple count of facilities does not fully capture the scale of expansion. For additional context, we also looked at how data centres have grown in terms of their IT power capacity. IT power capacity refers to the computing capacity of operating servers, storage and networking devices within data centres and it is typically measured in megawatts or gigawatts. Unlike the count of data centres, which can vary widely in size, purpose and technological sophistication, IT power capacity reflects the density and processing capacity of facilities. While the number of data centres grew by 11x since 2000, we estimate that total global IT power capacity grew by an estimated 53x, from 0.93 GW in 2000 to nearly 50 GW in 2025 (Fig. 8).

[21] Our analysis is based on a proprietary dataset of global data centres that have been announced and are expected to be completed up to 2025, this dataset was built based on information published on DCByte.

This exponential rise indicates a shift toward fewer but significantly larger and more powerful data centres. These large-scale facilities contain more servers, switches, and cooling systems—each of which requires silver in its core components. Even in the absence of precise silver loading data, the link is clear: a 5,252% increase in IT power means more computing hardware and more demand for silver.

Fig. 8. Global data centre IT power capacity, 2000-2025



Source: DCByte/Oxford Economics

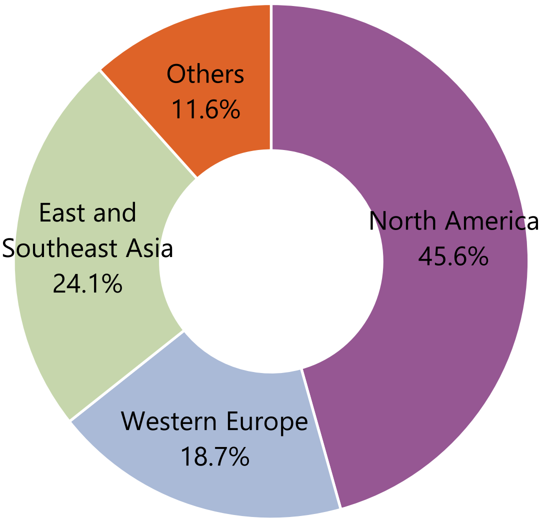
3.3 EXPECTED FUTURE SILVER DEMAND

Today, data centre computing capacity is concentrated in three regions, data centres in North America, Western Europe and East and Southeast Asia account for 88% of global computing capacity (Fig. 9). As demand for digital services expands to new regions, including Latin America, South Asia, and Africa, we expect data centre construction and silver demand to follow. While certain workloads—like AI model training—can be performed remotely and in power-advantaged regions, latency-sensitive applications (e.g., real-time cloud services, high-frequency trading, search engines) require proximity to end users. Latency refers to the delay between a user's action and the system's response on a network.[22] Given that many data centres' workloads depend on access to end-users, we expect that this geographic requirement will drive future growth in data centre construction in regions that are currently not home to as much capacity (i.e. South Asia, South America, etc), and, with it, rising demand for silver-rich components.

[22] Inference refers to when individuals use trained models to produce content, make predictions or conclusions: "AI inference is the process of applying what the AI model learned through ML (Machine Learning) to decide, predict or conclude from data." Source: "What is AI inference?", IBM.com, accessed July 2025

Fig. 9. Geographical distribution of data centre IT power capacity in 2025

Share of global IT power capacity (%)

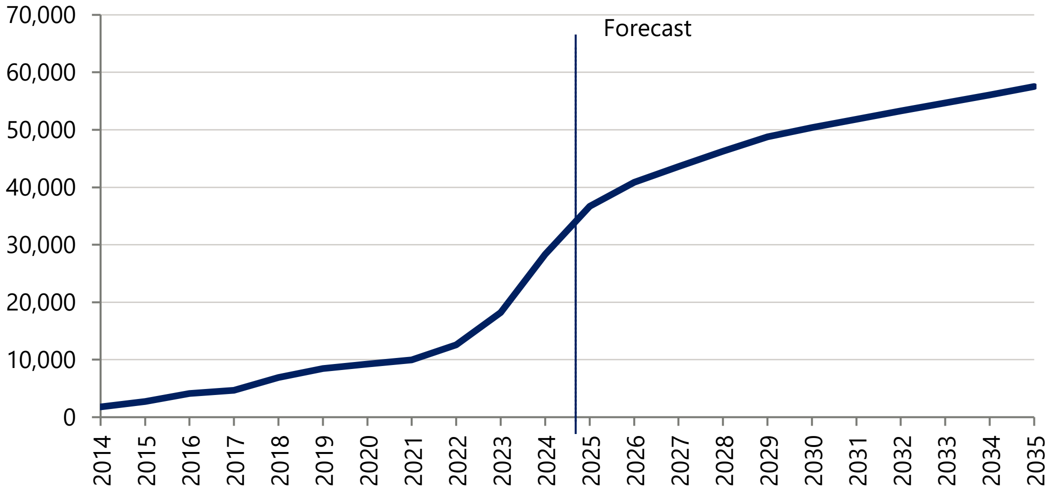


Source: DCByte/Oxford Economics

The United States alone accounts for over 22.57 GW of estimated IT power capacity, representing a high share of global IT computing equipment. Looking ahead, our in-house proprietary forecasts of data centre construction in the US suggest that this is set to continue expanding (Fig. 10).[23] We forecast that data centre construction work done will grow by 57% over the next 10 years in the US. This gives a clear benchmark for the expansion path of other established markets.

Fig. 10. The outlook for data centre construction in the US, 2025-2035

Data centre Private Construction Put-in-Place, $ (millions)



Source: Oxford Economics

[23] Put-In-Place is a measure construction activity. The value of Put-In-Place is the value of payments made for construction work undertaken during the reference period. It includes the cost of labour and materials fixed in place and excludes the value of land and the value of installed machinery and equipment not integral to the structure.

BOX 2: AI TECHNOLOGIES BEYOND DATA CENTRES WILL DRIVE ADDITIONAL SILVER DEMAND

The rise of artificial intelligence is expected to boost silver demand far beyond data centres. AI applications increasingly rely on specialised hardware such as graphics processing units (GPUs), tensor processing units (TPUs), and neural processing units (NPUs), all of which depend on high-performance semiconductors that use silver in their internal connections and packaging. Additionally, the broader electronics supporting AI integration—ranging from autonomous vehicles and robotics to edge computing devices—require silver-rich components such as fuses, switches, and sensors.[24]

As AI expands into consumer electronics, industrial automation, and smart infrastructure, the deployment of silver-bearing components across these end-use sectors is set to grow. These trends reinforce silver's role as a foundational material in the AI-driven economy.

Industrial demand for silver reached a record high in 2024, at 680.5 million ounces, this was underpinned by record electronics and electrical demand, driven by AI-related applications in consumer electronics and hardware.[25]

3.4 IMPACT OF GOVERNMENT POLICY AND TECHNOLOGICAL ADVANCEMENTS

3.4.1 GOVERNMENT POLICY

Governments around the world are recognising the strategic importance of data centres and rolling out policies to support their development. For example, in the United States, AI data centres were designated as a national priority in an Executive Order in January 2025—streamlining permitting, fast-tracking leases on federal sites, and offering support such as grants, offtake agreements, and tax incentives to stimulate rapid deployment of AI infrastructure.[26] These government policies that ease regulatory frameworks and offer incentives have also backed private sector led initiatives such as the Stargate Project, which aims to invest up to $500 billion in AI data centres in the US.[27]

Globally, similar programs are underway. In early 2025, the UK published its AI Opportunities Action Plan, explicitly naming "AI data centres and infrastructure" as a national priority; this followed the announcement of AI Growth Zones, place-based initiatives offering streamlined planning approval.[28] In the EU, governments in high-tech hubs are actively incentivising data centre growth. Ireland, for instance, has formally classified data centres as "core digital infrastructure" and offers low corporate

[24] The Silver Institute, Market Trend Report, Silver and Global Connectivity, September 2021. Huang et. al. Effects of bonding pressures on microstructure and mechanical properties of silver–tin alloy powders synthesized by ball milling for high-power electronics packaging, July-August 2022.
[25] The Silver Institute, Silver Industrial Demand Reached a Record 680.5 Moz in 2024, April 2025.
[26] The White House, Accelerating federal permitting of data center infrastructure, July 2025.
[27] OpenAI, Announcing The Stargate Project, January 2025.
[28] UK Department for Science, Innovation and Technology, AI Opportunities Action Plan: government response, January 2025.

tax, streamlined permitting, and land ready for redeployment—partially explaining why Ireland has attracted investment from Google, Meta, Amazon and hyperscale providers.[29] In response to growing demand for AI- and cloud-enabled services, China's Ministry of Industry and Information Technology introduced a 2024 pilot program permitting 100% foreign ownership of data centres in Beijing, Shanghai, Shenzhen and Hainan—marking a significant opening of its previously restricted data centre market. China is also pursuing an "Eastern Data & Western Computing" policy to locate new data centres in regions with favourable land, cooling and renewable-power conditions.[30]

Such initiatives reduce regulatory hurdles, lower investment risk, and support the long-term scale-up of global data centre capacity—driving corresponding growth in demand for enabling materials such as silver.

3.4.2 TECHNOLGICAL ADVANCEMENTS

3.4.3 Accelerating digitalisation and uptake of Artificial Intelligence

The expansion of the data centre market reflects broader structural trends: accelerating digitalisation and the widespread uptake of AI. These trends are expected to continue gathering pace, placing growing demands on digital and physical infrastructure.

As businesses have migrated workloads to the cloud, demand for data infrastructure has grown in parallel. At a global level, the International Data Corporation (IDC) reported that spending on public cloud services has been outpacing total growth in overall IT expenditure.[31] The IDC also forecasts that global public cloud services spending will double by 2028.[32]

Data centres are also essential in the development of AI, providing the computing power and storage needed to train large language models and run real-time inference. The rapid pace of this adoption is a particularly important contributor to future demand for data infrastructure. Early data suggests that adoption of AI by households has been faster than with other transformative digital technologies in the past (i.e. the internet or personal computers).[33]

The training compute of frontier AI models has been growing. According to Epoch AI, the compute used to train frontier AI models grew 4–5x yearly from 2010 to 2024.[34] Moreover, the nature of AI use also influences the compute requirements of data centres. Tasks such as video and image generation are considerably more compute-intensive than text-based AI functions like summarisation or search. As AI applications diversify into media production, design, and simulation, demand for compute and, by extension, data centre infrastructure is expected to continue growing.

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[29] Government of Ireland, Government Statement on the Role of Data Centres in Ireland's Enterprise Strategy, July 2022.

[30] Morrison Foerster, China Pilots Relaxed Foreign Ownership Limits for Data Center and Other Value-Added Telecom Services, April 2024. Zhang et. al. The "Eastern Data and Western Computing" initiative in China contributes to its net-zero target. August 2024.

[31] IDC, 2023. Worldwide Black Book: Live Edition, July (V2 2023) Forecast (published July 2023).

[32] IDC, Worldwide Spending on Public Cloud Services is Forecast to Double Between 2024 and 2028, According to New IDC Spending Guide. July 2024.

[33] IEA, What the data centre and AI boom could mean for the energy sector, October 2024.

[34] Epoch Ai, Machine Learning Trends, as updated January 2025.

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