

The era of electric transportation has arrived – EVs boom and ICE gloom

Electric vehicles (EVs) are set to play an important role in reducing global pollution by offering a more energy efficient and less polluting alternative to the conventional internal combustion engine (ICE).

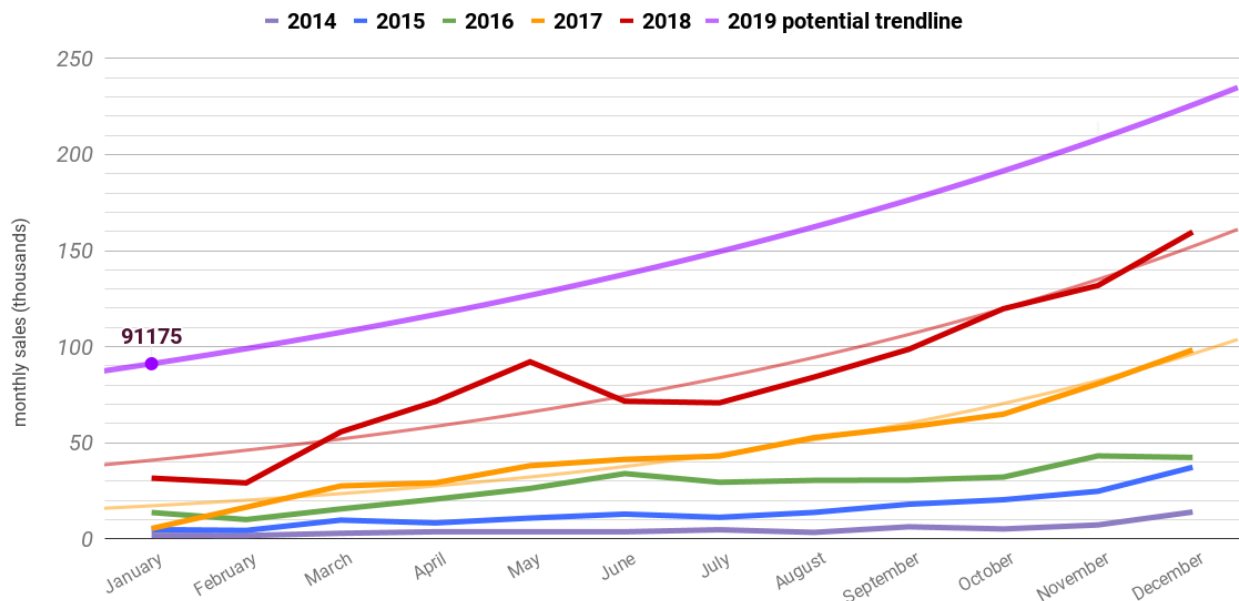
Electric car sales rose 72% in 2018 and continue to grow strongly in 2019

EV-Sales.com reported 2018 global electric car sales of over 2 million reaching 2.1% market share, up 72% on 2017. So far in 2019 sales remain strong up 83% based just on January's results. China sales started 2019 with a bang up 175% YoY, after hitting 8% market share in December 2018.

Electric car sales are projected to be strong again in 2019 (purple line)

China New Energy Vehicle sales 2014 - 2019

Passenger vehicles only (excludes commercial vehicles), numbers in thousands (data source: CPCA)



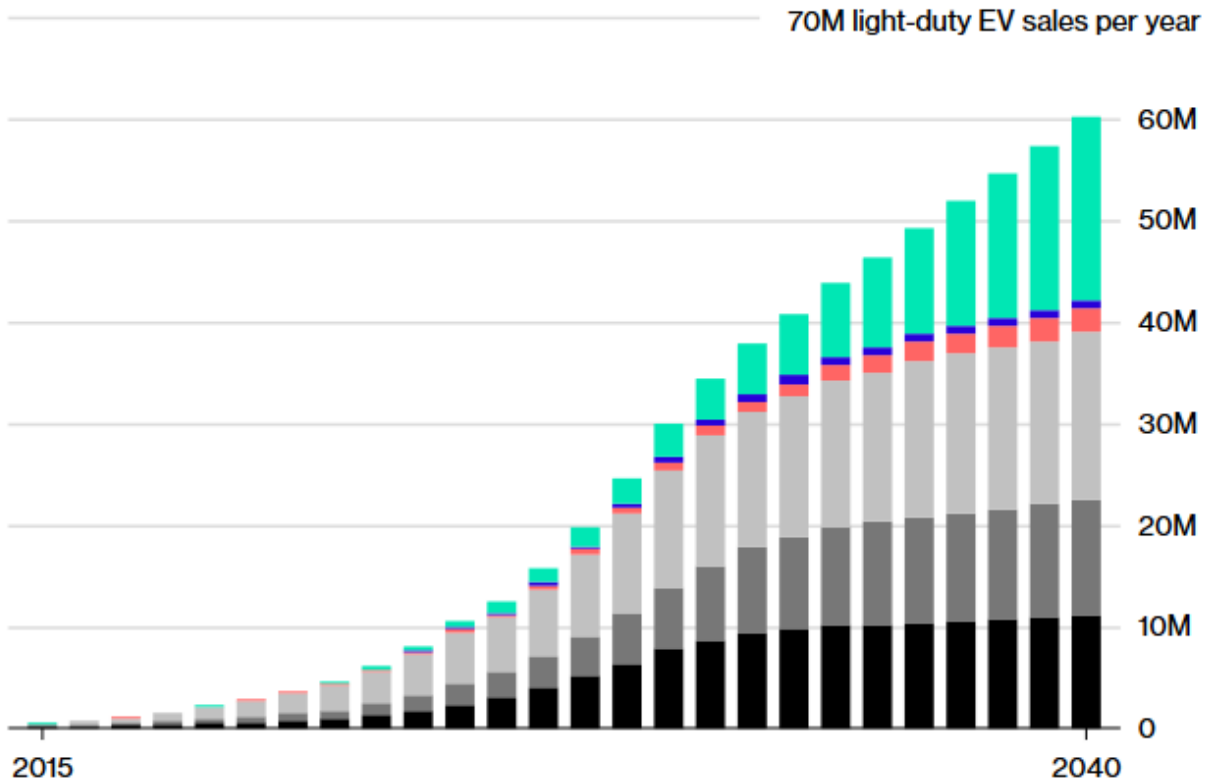
Electric car are projected to be strong again in 2019

Electric car sales are forecast to grow exponentially in the 2020's

Bloomberg and others are forecasting an exponential growth in EVs, as shown below. In fact, Bloomberg is forecasting electric car market share to reach 11% by 2025, 28% by 2030, 43% by 2035, and 55% by 2040.

Bloomberg's forecast annual electric vehicle sales – 30m pa by 2030, 60m pa by 2040

■ Europe ■ U.S. ■ China ■ Japan ■ Korea ■ Rest of World



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China dominates EV sales and production, and Tesla dominates US sales and production

In 2018 China sold ~1 million electric cars, or ~50% of all global light electric car sales. BYD Co (20% share), BAIC (15%), and SAIC (7%) were the top 3 sellers in China.

Meanwhile in the US, Tesla dominates with 53% of all US electric car sales in 2018. The Model 3 leads the way and is by far the best selling electric car globally, with 7% of all global electric car sales in 2018.

Tesla Model 3 – The clear global leader in electric car models in 2018



Tesla Model 3 – The clear global leader in electric car models in 2018

Conventional car companies are also rushing to produce electric cars

All the conventional car companies now have plans for electric cars. Volkswagen leads the charge announcing plans to spend Euro 40b (USD 50b) on electric cars by 2023. Porsche is bringing out the very popular Taycan in 2019, and Nissan, BMW, Audi, GM, Kia, Hyundai and others (including many Chinese brands) all have great electric cars. Volvo plans to go 50% electric by 2025, and many others will copy this target.

Porsche Taycan 2019/2020 – 100% electric



The new 2019/2020 Porsche Taycan

What to expect next

By end 2019

- More electric car models and with longer range.
- Much more electric charging stations, more advancements in fast charging, more battery mega-factories, cheaper batteries, cheaper electric cars.
- More electric bus fleets and electric taxis being rolled out globally.
- Some electric trucks starting to appear, and many more electric bikes.

By end 2020:

- Electric bikes, buses, trucks and taxis becoming common in larger cities.
- Some electric semis may arrive on the scene, and the electric pickup truck should arrive.
- Electric ships appearing on our rivers and oceans.

- More autonomous and ride-sharing vehicles arriving.

By end 2022

- There could be over 280 different models of electric cars's across the spectrum.
- Most new cars will be "connected smart" cars – giving online internet access to the likes of 4G and 5G, making Advanced Driver Assistance Systems [ADAS] common place.
- Electric bikes, trucks, ships and boats becoming increasingly common.
- Hybrid electric planes starting to appear, initially in smaller planes. Larger planes starting to develop a balance between electric and conventional propulsion.
- Autonomous vehicles becoming increasingly common, especially on set routes and closed routes

By 2025-2030

- Many cities (London, Paris, Stuttgart, Mexico City, Madrid, and Athens) to ban Internal Combustion Engine (ICE) vehicles or at least impose severe limitations.
- Many countries (Netherlands, China, Germany, France, UK, Israel) to ban ICE vehicles.

Conventional internal combustion engine sales are now in decline (down 2.8% in 2018), while electric car sales are booming (up 72% in 2018). It certainly appears car buyers are changing to electric, and this should only increase once electric cars are cheaper by 2022/23.

The era of electric transportation has arrived – electric bikes, cars, trucks, taxis, boats, ships, trains, and even some planes. Expect to see massive changes to the way we live our lives in a cleaner and greener planet.

The Dixie Chicks Serenade the CRTC on CASL

*The weeks went by and spring turned to summer,
And summer faded into fall.
And it turns out he was a missing person
Who nobody missed at all.*

That's the Dixie Chicks saying goodbye to Earl, but it could just as easily apply to the CRTC (Canadian Radio-television and Telecommunications Commission). Cue the banjo.

The CRTC is Canada's national regulator having responsibility for broadcasting and telecommunications. It decides how badly the cable companies can gouge you for channels you don't want, how to create competition in the mobile world, and how much Canadian content gets played on Canada's media. It is also the primary regulator for CASL, Canada's AntiSpam Legislation.

In parallel to the CRTC is Innovation, Science and Economic Development Canada (formerly Industry Canada), which is responsible for the more technical matters related to this field such as allocation of frequencies.

At its website the CRTC claims it is, "Committed to ensuring that Canadians – as citizens, creators and consumers – have access to a world-class communication system." We can't do that if our digital world is polluted with spam, scams and malware, and CASL is supposed to help defend us against those risks.

CASL as a concept is a tremendous way to advance and protect Canada's digital and analog economies. No one can argue with the idea that we ought to have some federal statutory protection against online scammers, thieves, hackers, ransomware and spammers. Almost every survey of the top business risks for 2018 include some reference to malware /

scams / privacy breaches in the top 10.

But, while the theory is clean, the implementation of CASL is anything but. It's not a business-friendly piece of legislation, and despite the CRTC's excellent historic public education efforts, is still a relative unknown.

Since the statute went into effect in July, 2014, there have only a handful of substantive decisions from the CRTC. Picking on Rogers Communications, Porter Airlines and Kellogg's isn't exactly an attack on the spammers. Meanwhile, every day seems to bring a news item of another data breach, another hack, more ransomware, each of which goes undeterred by the CRTC and ISED.

As part of a statutory review of CASL, ISED held public hearings in the fall of 2017. We submitted a written brief encouraging the regulators to allow the free market to regulate spam (one of the few occasions where "more lawyers!" is the right answer). The CRTC submitted its own brief, which can be read [here](#).

Very few submissions came to the public hearings in support of CASL. The main complaints centre around the extreme difficulties of proving consent, the expiry dates for implied consent, the internal contradictions between parts of the statute, a lack of clarity on enforcement, and the private right of action (PRA).

The CRTC's submission to ISED contained the usual political blumphus one would expect of a government body making a formal submission to another government body. But it did contain one very interesting statement. The CRTC submitted that, "**market-based solutions for CASL compliance exist. It's up to businesses to use them.**" I agree. Outsourced technical solutions are the most efficient means for any business to implement CASL compliance. The best one I know of is based in London, Ontario.

I had a on-the-record phone conversation with the CRTC in September, 2017. I was concerned about ISED having delayed the implementation of the PRA in June, 2017. From my perspective and as laid out in my brief, CASL without a PRA is unenforceable and therefore meaningless to the average Canadian. Businesses have little reason to fear the CRTC, but they are terrified of opportunistic class action litigation lawyers.

In that phone conversation the CRTC told me it was moving on certain matters (which were understandably confidential) and that we should watch for news. That was the end of September. Two months later, all we've seen is an update to the Compu-Finder decision, in which update the CRTC reduced its own fine and found (surprise, surprise) it had the constitutional jurisdiction to decide whether CASL contravened Canada's *Charter of Rights and Freedoms*. Riveting stuff, indeed.

The CRTC needs to get back in the game. It needs to start taking heads instead of notes. If it doesn't, it may be sharing a resting place with Earl.

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China pushes graphite plans at advanced materials meeting



The Chinese news agency Xinhua sent out an intriguing, but short-on-detail, report this week. It quoted one E. Zhongqi, president of the Heilongjiang province division of the China Council for the Promotion of International Trade, saying that his northeastern province was looking to the expansion of the graphite industry to help trigger industrial revival. The province is being hard hit by the running down of coal mining.

He said the upcoming China Harbin International Economic and Trade Fair would bring “an excellent opportunity to promote the development of the graphite industry”. He added: “It (graphite) will play a vital role in the transformation of the coal cities.”

Zhongqi went on to say that a graphite-themed exhibition had been specifically set up during this year’s trade fair to connect potential business partners in China and Russia.

What the Xinhua report omitted to say – and this is rather crucial to knowing what is going on with graphite and China – is that being held in conjunction with the Harbin trade fair was the 4th China Advanced Materials Industry Fair, which gives the discussion of graphite a little more import. (Harbin is the capital of Heilongjiang province.) The combined fairs opened on Thursday this week.

What with all the rush to graphite in recent years by a welter of Western junior exploration companies, perhaps we have not been paying enough attention as to what is happening in the China graphite sector. After all, it is the major power, producing something like four times the amount of graphite each year as the runner-up, India.

And there was another sign of action with a report that the Provincial Ministry of Lands and Resources in Shaanxi province announcing it was pushing for moves into producing high quality specialty metals with *a focus on graphite* (my emphasis).

Alas, that is as much as I am able to tell you from news reports. We don't seem to have much information available publicly. There have been developments in recent years; in 2014 plans were announced to replicate the mergers of producers that had taken place in the rare earths industry, and to close down small and polluting mines to help improve water and air quality. As Northern Graphite Corporation (TSXV:NGC | OTCQX: NGPHF) notes on its website:

China is very serious about these reforms as evidenced by the fact that in 2012 it invested \$150 million to create Southern Graphite Ltd., a state owned amorphous graphite monopoly. The new company is consolidating 230 mines down to 20 which will reduce the country's production capacity from 600,000tpa to 510,000tpa. Furthermore, in late 2013 the Chinese government closed 20% of its flake graphite production capacity for environmental reasons. In order to protect its industry and

encourage value added processing at home, China has instituted a 20% export duty on graphite, as well as a 17% VAT, and an export licensing system.

It is also true that China is the top market: a new report from New York-based Persistence Market Research confirms China accounts for more than 70% of total graphite production in the world. According to China's Twelfth Five Year Plan, the government plans to have five million battery-electric vehicles plying its roads by 2020.

Given the need for lithium-ion batteries, the boost in electric vehicles, mobiles, tablets, laptops, and cameras offers huge potential for the growth of Li-ion batteries, and in turn for the demand for graphite. Don't forget Europe: it is the second largest graphite market in the world. Persistence adds that the growing use of carbon fibre instead of steel in the automotive and aerospace industries in Europe is leading to increasing demand there for graphite.

It will pay to keep an eye on China's graphite industry.

Cruz Capital looks to grab promising ground as cobalt frenzy about to explode

Search Google News for "cobalt exploration" and you'll find scant information. That's about to change, and **Cruz Capital Corp (TSXV: CUZ | Germany: A2AG5M)** is intending to be out there in the lead. And it expects that this is just in time: the signs are that the cobalt stampede is about to begin, just as we saw hordes of juniors looking to turn their fortunes

around by, first, embracing graphite and then lithium as the tide changed toward the latter – just as the juniors had done with uranium in 2007 and phosphate a year later.

Cruz Capital announced this week that it had acquired the War Eagle cobalt prospect in the Fort Steele mining division of British Columbia. Not much is known about this project: back in 1948 a file was lodged with the province's government, reporting that there were old workings there, and test pits, but there is no immediate information as to when and how the prospect was mined – and if anything was ever produced of note. But what whetted Cruz Capital's appetite was the notation in the file that there had been surface sampling that had produced assays of 6.41% cobalt, 3.59% nickel and 7.25% copper – grades that are more than encouraging. Cruz knows these numbers cannot be relied upon; there is no knowing who compiled them or the manner in which the grades were assessed. But these figures are good enough a target to encourage Cruz to send crews to the property shortly to begin a proper assessment.

Cruz has realized that no one much has been looking for cobalt of late – but they will soon be as people realize that there's a looming shortage and this could inhibit the production of lithium-ion batteries.

(Incidentally, despite its name, Cruz is not a financial house: its most recent project was a gold property in Tanzania.)

The company is planning to peg cobalt prospects in the United States and Australia as well as in Canada, getting these secured before the expected land rush occurs. They will either joint venture these, or advance exploration and development.

Cruz is probably acting not too soon: on Thursday, an Australian junior, Corazon Mining (ASX: CZN) announced it had secured a cobalt (and copper and gold) project near Grafton,

New South Wales. The stock rose 42.8% with 40 million shares changing hands. Also in recent days Broken Hill Prospecting (ASX: BPL) has managed to raise about A\$1 million and will now update the scoping study on its Thackaringa cobalt project near Broken Hill, NSW.

Expect more of these announcements.

It's all about batteries: Jim Nelson, president of Cruz Capital, said he expected cobalt demand, primarily for electric vehicle batteries, would continue to increase in the near and distant futures. "We feel cobalt has been under-exposed in light of lithium companies dominating the market place," he added.

Reuters reported last week that prices for cobalt metal are expected to rise by 45% by 2020 as stricter emissions controls push demand for electric vehicles. In fact, Reuters used a sub-heading in the report stating "Stampede for Cobalt" – a prediction that concurs with Cruz Capital's view of the market.

As the agency pointed out, China has few cobalt resources, which is why the State Reserves Bureau in Beijing late last year bought 2,200 tonnes of the metal. Traders say China is in the market at present for another 2,800 tonnes. Many see the recent move by China Molybdenum to buy the Tenke copper mine in the Democratic Republic of Congo as being largely motivated by the need to secure reliable cobalt supplies through Tenke's main by-product.

There is growing consensus on the subject of the size of the coming cobalt deficit that it will reach at least 7,000 tonnes a year – not much if you're talking iron ore or even copper, but big news for cobalt.

About 60% of cobalt supply comes as a by-product from mining copper. Another 30% comes as a by-product of nickel. Only 10% comes from primary cobalt mining – and this is where the

speculative action is going to be, not in some company announcing it has small amounts of cobalt in a copper deposit.

Cruz Capital is on the scent of good cobalt targets – and is sure plenty of other juniors will soon be joining it.

Publisher's Note: Cruz Capital Corp. has 6.475,582 shares outstanding and is a new InvestorIntel member.

Rare earths search picks up as focus back on need for new supplies

Feel that? “That” is a sudden shift in the ground under the rare earths. In fact, Dudley Kingsnorth, speaking at the recently held 5th Annual Cleantech and Technology Metals Summit, hinted at one factor that might change the REE picture: the cheap price of cerium may lead to more applications using it.

But there are two main trends: one is a growing realization that, while we've been talking about lithium and other technology metals, a large chunk of electronics and technology still relies on various rare earth elements. Yes, lithium is going to be big, but future supply of that does not at this stage seem to be in doubt, what with all the contenders falling over each other to get into that business – and most particularly the fact that it can be sourced from a range of geological locations (Bolivia, Canada, Australia among them) rather than China having the whip hand.

In fact a writer in *The Irish Times* made this point recently

when he wrote, after discussing lithium, **“what the world really needs now is cheaper and more reliable sources of the rare earth elements”**. While not quite making sense (the last thing the industry needs is cheaper REE as it can barely function with those prices now applying) you can see that his heart is in the right place. Yes, we do need more “reliable” sources of rare earths in the sense of having sources outside of China. But we have talked ourselves hoarse over the years about the long-term danger of depending on China without any resolution; perhaps, thanks to *The Irish Times*, we might focus our minds back on that.

The other trend is signaled by a number of news stories concerning the ability of the United States to get back into production of rare earths – something that has long been urged by those concerned about the resource securities issue.

The first item is the only one that has direct bearing on *mining* of rare earths in the US as opposed to *extraction* of them.

The Manchester, England, based advanced metals study group, AZOM, reports on work in the US concerning new aluminium-cerium alloys. The Oak Ridge National Laboratory is working with Eck Industries and the Lawrence Livermore National Laboratory on including cerium in these, making the alloy more workable and malleable.

This is the important point, according to AZOM: the most common REE-containing ore in the US, it says, has 500 times the amount of cerium than dysprosium (and a factor of three to neodymium). AZOM argues that if a market could be found for that cerium, then REE mining in the US becomes more attractive because adding 1% of cerium into aluminium alloys would provide a market for 3,000 tonnes of cerium a year.

(An important aside: this is not InvestorIntel claiming this to be the case; we are just reporting what has been claimed.)

This is what AZOM says: "if the new alloys are adapted for use in internal combustion engines, they could swiftly convert cerium from a problematic by-product of rare earth mining to an important product in itself. These aluminum-cerium alloys would allow engines to enhance fuel efficiency directly by operating hotter. They may also optimize fuel efficiency indirectly, and thereby leading the way for development of lighter engines that use small aluminum-based parts or use aluminum alloys to substitute cast iron parts such as transmission cases, cylinder blocks, and cylinder heads."

The second item comes from the Pratt School of Engineering at Duke University in Durham, North Carolina. They recently produced a study showing that ashes from coal mined from the Appalachian Mountains could be a source of some technology metals. University researchers have measured the content of rare earth elements in samples of coal ash from every major coal source in the US. The results showed that coal from the Appalachians contained the most rare earths. Heileen Hsu-Kim, associate professor of civil and environmental engineering at Duke, concludes that "there's literally billions of dollars worth of rare earths elements contained in our nation's coal ash".

The researchers used an extraction technique involving nitric acid and concluded that it would be possible to extract elements such as neodymium, europium, terbium, dysprosium, yttrium and erbium from the burned coal. Hsu-Kim said the next stage would be to look at the cost of extraction. "The trick will be exploring our options and developing technologies to drive the costs down."

Thirdly, University of Wyoming researchers have joined those at the Idaho National Laboratory and the US Geological Survey to study retrieving REE from water produced in oil and gas production and geothermal projects.

How many of these will ever eventuate no one can guess.

And, true, investigations into extracting rather than mining do not help the mining companies that hope to get into producing these elements out of the ground.

But the take-home from this post is that the reliable supply of REE is still very much an issue. And that the development of new mines outside China is still much needed because, even with lithium flying high, much of our technology will still depend on REE.

Silver's cleantech appeal burnished by solar power boom

If you think about silver these days, you have to build into that thinking the metal's growing role as a cleantech metal – and that's mainly due to the solar industry, which stands out in a slackening global economy as one of the more exciting metal growth stories.

A few months ago the gold:silver price ratio was at 1:85, historically on the high side (it was once 1:16). Now it is 1:76. So gold is 76 times more valuable per ounce than silver yet there are only nine ounces of silver mined for every one ounce of gold pulled out of the ground. And with silver's growing industrial uses, that production equation must at some stage begin to affect the price ratio – although few would go so far as to predict \$140/oz by 2019 (compared to \$16 as I write this), as one Canadian mining CEO did last week.

Keith Neumeyer of First Majestic Silver Corp, in making that prediction, did present an interesting argument: the planet is being electrified (electric cars, solar panels) and silver is the most electrically conductive material on the planet other

than gold – and gold is too expensive to use in circuit boards and car batteries.

But is it solar panels that have got some investors excited about silver. Silver is a precious metal, and an industrial metal, a technology metal – and, now, a cleantech metal.

As the Washington-based Silver Institute explains, “silver is a primary ingredient in the photovoltaic cells that catch the sun’s rays and transform them into energy. Ninety per cent of crystalline silicon photovoltaic cells (the most common cell) use silver paste and close to 70 million ounces of silver are projected for use by solar energy by 2016”.

In fact, demand for silver in the solar industry reached 78 million ounces in 2015, up an astounding 23% over 2014. The solar sector off-take now represents 17% of the silver used in industrial applications, up from 2% two years ago. China installed an additional 7.1 gigawatts in solar capacity in the first quarter of 2016.

Simona Gambarini of London-based Capital Economist reckons that the strong growth in the number of solar installations in China and the U.S. should see silver demand from the sector up another 20% in 2016. This will more than compensate for the overall fall of silver use in other industrial applications that has occurred over the past three years.

The International Energy Agency estimates that global solar capacity increased by about 40 gigawatts in 2014. Over the past 10 years, global PV capacity has increased at an average annual growth rate of 51%, rising from 4.2GW in 2005 to 226GW in 2015.

China’s National Energy Administration has said that country plans to add up to 20GW of capacity a year, for five years. As Gambarini notes, the U.S. solar industry will continue to benefit from the Investment Tax Credit, a 30% tax credit for solar systems on residential and commercial installations,

which has been extended to 2022. There is also the potential implementation of the Clean Power Plan.

She also makes the point that thrifting is not a concern: as silver paste accounts for only about 5% of total cost of PV panels, there is no great urge to reduce the proportion of silver.

And there is potential for growth that could affect the silver demand/supply situation. First Majestic's Neumeyer said last week his company had just been approached by a Japanese electronics maker that wanted to lock in future silver supply, which he sees as a sign of supply concerns.