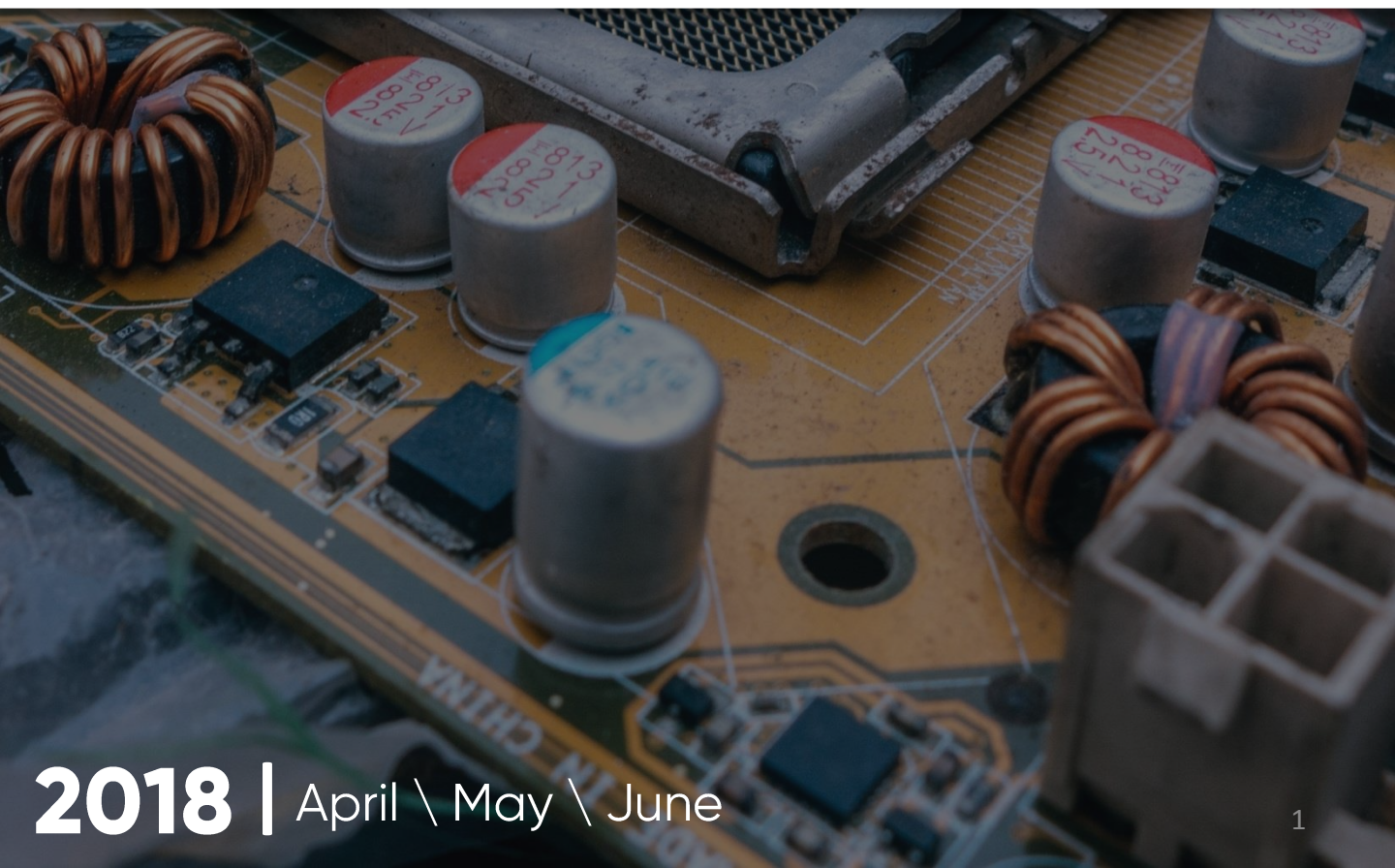


# SUPPLY INTELLIGENCE

## Materials Report



# Market trends and analysis report

- \ MLCC and Chip Resistors continue to be constrained and on allocation.
- \ Tantalums , Aluminum caps, SMD 3-10 mm constrained.
- \ Rectifiers rapidly increasing and product availability constrained.
- \ TVS & ESD Diodes lead time increasing and constrained.
- \ Current sensors, metal strip sensing, wire wound sensing, both constrained. ST Micro reports 26 week lead times on up.
- \ Inductors IHLP series 52 plus weeks constrained especially for the automotive parts .
- \ Passives have historically been the low cost components so there isn't any incentive for component Manufacturers to add capacity instead they are reaping the benefits of improved profit margins.
- \ AVX is slowly reducing production capacity and eventually expected to stop producing general purpose ceramic capacitors.
- \ Wafer stock is starting to decrease and is creating issues on a lot of active components

**Most Manufacturers are focusing on the automotive industry.  
No sign of relief this year 2018.**

# Main causes of the shortage crisis

- \ **Factors driving the high volume demand are the smartphones, automotive/EV industry, and IoT.**
- \ While visiting one particular manufacturer of MLCC's (multi-layer ceramic chip capacitors), we were advised that a regular smart phone can use up to 800+ MLCC 's ,and an iPhone 8 up can use 1200+ MLCC's per phone keeping up with all the new features. Mobile operating systems, HD display pixel camera resolution, etc. Imagine this is just the smartphone industry, we have IoT (internet of things) and Automotive industries especially Electric Vehicles, **all competing for the same parts.** Huge increase in electronic components for the **whole world.**
- \ The manufacturers of these devices are choosing to be more selective in their product mix, shifting their capacities to leading-edge technologies. **We see very minimal capacity increases by the manufacturers on these allocated products.** A lot of the manufacturers are moving away from the manufacturing of the large case sizes.
- \ Many suppliers are implementing processes for allocation of standard electronic components.
- \ The way companies are dealing with allocating supplies is on a customer basis, using previous years demand levels, Servicing only their current customers.

# Main causes of the shortage crisis

- \ Supplies tight, price is increasing, especially for passive components, resistors, ceramic chip capacitors.
- \ As fast as supplies of these components are released they are purchased, not only by the customers that need them, but independent Suppliers taking **opportunistic views**.
- \ In the past large case size parts have seen the demand double, but have not seen any price increases, and they have not been very profitable.
- \ We have stated previously **multiple sources for each part will help to sustain your inventory supply**, a good thing to consider when designing new products.
- \ A while back customers switched from Tantalum to MLCC's due to allocation and shortages, now they might want to reconsider especially looking at polymer capacitors.
- \ We suggest when designing new products, that you check lead times, availability multiple sources, and check into upgraded technology.
- \ **These allocations and constraints are expected to last through the end of 2018.**



# LEADTIMES & PRICING Analysis

- \ **Passives** – Increased lead time and prices. Major driver is the Automotive EV vehicles, and the mobile markets. Continued constraints and allocation.
- \ **MLCC** – Multilayer ceramic capacitors are constrained and on allocation. A number of major lines from Vishay, AVX, Murata, Panasonic, KOA, Kemet, and Rohm, have been on allocation for some time now. Yageo is very constrained and in some cases rejecting orders. We expect this to only get worse through 2018.
- \ **Chip Resistors** – Lead times 50 plus weeks constrained and on allocation Vishay has been on allocation for some time, a number of other manufacturers are on allocation will continue through the end of this year at least.
- \ **Discrete** – Majority of the Discrete devices increased lead time and pricing. Especially your TVS and esd diodes.
- \ **Mosfet's** – have been increasing driven by tablet and smart phone market 15-20 wks. Legacy IR series Mosfets have been increasing following acquisition by Infineon with IRFHM830XXX, IRFHM831XXX, IRLHM620XXX among the affected product

# LEADTIMES & PRICING Analysis

- \ **Sensors** – Melexis, Infineon, ST Micro, On Semi 16-40 weeks. ST advises automotive components lead time is stretching.
- \ **Relays** – Zettler, Honfa, Panasonic some series constrained, all others appear to be stable
- \ **Filters and Inductors** – Lead times increasing 36+ weeks.
- \ **Memory DRAM** – on allocation, other parts constrained: NAND FLASH- constrained and price increasing
- \ **Microchip** – Constrained.

## Strategies for Increased lead times

The best way to prepare for shortages :

- \ Keep lead times up to date
- \ Keep your customers informed
- \ Extended forecast – suggest 12 month rolling forecast, and extended firm orders.
- \ VMI/BMI Programs
- \ Multiple Sourcing
- \ We are suggesting open source on bill of materials for standard mlcc's and chip resistors.

\*All indicators show the constraints mentioned in this report will last through 2018 into 2019.

**The better your forecast and firm orders are, the better service we can expect.**

## Non-Volatile & Volatile Memory

	Pricing	Lead Time	Supply	General Lead Time
Nand-Flash	Increase	Increases	Lt.'s extend	11-26w
Nor-Flash	Increase	Increases	Lt.'s extend	8-22w
EeProm	Stable	Increases	Lt.'s extend	3-18w
SRAM	Stable	Stable	Lt.'s extend	6-30w
DRAM	Stable	Stable	No constraints	6-10w
DDR3-DDR4	Stable	Increases	Lt.'s extend	8-10w
EPROM	Stable	Stable	Lt.'s extend	10-14w

- \ Constrained and some allocation for Nand-Flash and Nor-Flash
- \ Lead time inc. pricing stable at this time ofr EeProm
- \ Stabilizing-ST Micro still long lead times & Cypress has a lot of EOL product. Micron still long lead time
- \ Seems to be Stabilizing for DRAM
- \ Increased lead times & Micron on Allocation for DDR3
- \ Atmel pricing increase



## Analog, Linear, Logic

	Pricing	Lead Time	Supply	General Lead Time
Data converters	Stable	Stable	No constraints	8-24+ w
Amplifiers	Stable	Stable	No constraints	8-24 w
Interfaces	Stable	Stable	No constraints	8-20 w
Power Management	Stable	Stable	No constraints	2-16 w
Logic	Increases	Increases	Lt.'s extend	12-28 w
Programmable Logic-FPGA	Stable	Stable	No constraints	8-16 w
Linear	Stable	Stable	No constraints	4-22 w
Sensors	Stable	Stable	No constraints	16-30 w
Standard Analog	Stable	Stable	No constraints	6-8 w

- \ Data Converters are stable besides Automotive VNX series : 24+ weeks
- \ Amplifiers are mostly stable On-Semi and ST Micro increasing lead times, 26 weeks for ST Micro, and 20 weeks for On-Semi
- \ Power Management are stable
- \ Sensors are starting to stabilize
- \ Logic are increasing

## Passives

	Pricing	Lead Time	Supply	General Lead Time
Chip Resistors	Increases	Increases	Allocation	12-50w and allocation
Network & Array Resistors	Stable	Increases	Lt.'s extend	+16w
Non-Linear Resistors Thermistors	Stable	Stable	Lt.'s extend	13-15w
Trimmers & Pots	Stable	Stable	No constraints	10-16w
Varistors	Stable	Stable	No constraints	6-14w
Fuses	Stable	Stable	No constraints	2-10w
Frequency Control-Crystals & Oscillators	Stable	Stable	No constraints	10-14w
Resonators	Stable	Stable	No constraints	12-14w
Filters	Stable	Increases	Lt.'s extend	8-32w

- \ Chips resistor-0402,0805,1210-2512, 0201, 0603,1206 all very constrained Vishay and other manufacturers on allocation
- \ Increasing- Rohm allocation. Vishay constrained.
- \ Trimmers & Pots = Murata EOL, Panasonic EOL by end of 2017
- \ TDK increased lead times 32
- \ The rest are stable

## Passives Continued

	Pricing	Lead Time	Supply	General Lead Time
Ceramic Capacitors	Increases	Increases	Allocation	20-52+w
SMP Tantalum Capacitors	Increases	Increases	Lt.'s extend	20-40w
Film Capacitors	Stable	Increases	Lt.'s extend	12-16w
Aluminum Capacitors	Stable	Increases	Lt.'s extend	15-40w
Coils-inductors-chokes	Stable	Stable	No constraints	8-20w
Transformers	Stable	Increases	Lt.'s extend	10-14w
Ferrites	Stable	Stable	No constraints	6-12w
Inductors	Stable	Increases	Lt.'s extend	4-40+w

- \ Almost all MLCC constrained. constrained or on allocation- Kemet, Murata & Vishay on-allocation. Yageo Constrained
- \ Tantalum Capacitors very constrained
- \ Aluminum Capacitors SMD 3-10 mm constrained-increasing
- \ Inductors Large case sizes 3232,4040,6767 and all automotive parts ending in A 24-40 plus weeks.

## Discretes

	Pricing	Lead Time	Supply	General Lead Time
Thyristors	Stable	Increases	Lt.'s extend	17-26w
BiPolar Transistors	Stable	Stable	No constraints	4-12w
IGBTs	Stable	Stable	No constraints	4-16w
Transient Voltage Suppressors	Stable	Stable	No constraints	6-18w
Rectifiers	Stable	Increases	Lt.'s extend	12-45w
Small Signal Devices	Stable	Stable	No constraints	6-16w
Zener Diodes	Stable	Stable	No constraints	4-10w
MOSFETs	Stable	Increases	Lt.'s extend	6-16w

- \ Lead time increase for Thyristors and Rectifiers.
- \ For MOSFETs, IXYS is your best choice, but lead times expanding on this manufacturer also.
- \ Rest is stable

## Connectors

	Pricing	Lead Time	Supply	General Lead Time
HeadersDin, PCB	Stable	Stable	No constraints	6-12w
Board to Board High Speed	Stable	Stable	No constraints	8-14w
I/O , D-sub	Stable	Stable	No constraints	6-10w
IC Sockets	Stable	Stable	No constraints	8-14w
Terminal Blocks & Crimps	Stable	Stable	No constraints	6-12w
RF Connectors	Stable	Stable	No constraints	6-12w
Automotive	Stable	Stable	No constraints	6-12w

- Stable for all connectors

## Electro Mechanical and Optoelectronics

	Pricing	Lead Time	Supply	General Lead Time
Circuit Breakers	Stable	Stable	No constraints	Stock-14w
Fans & Blowers	Stable	Stable	No constraints	14-16w
Heat Sinks	Stable	Stable	No constraints	Stock-8w
Relays	Stable	Stable	No constraints	6-26 w
Sensors	Stable	Stable	No constraints	8-10w
Switches	Stable	Stable	No constraints	8- 12w
Power Supplies	Stable	Stable	No constraints	6-14w
Infrared Comp	Stable	Stable	No constraints	6-14w
Isolation Comp	Stable	Stable	No constraints	4-16w
LED Displays	Stable	Stable	No constraints	8-12w
LED	Stable	Stable	No constraints	6-12w

\ Panasonic series still long lead time up to 26 weeks.

\ All others are stable.



## Drawing Parts

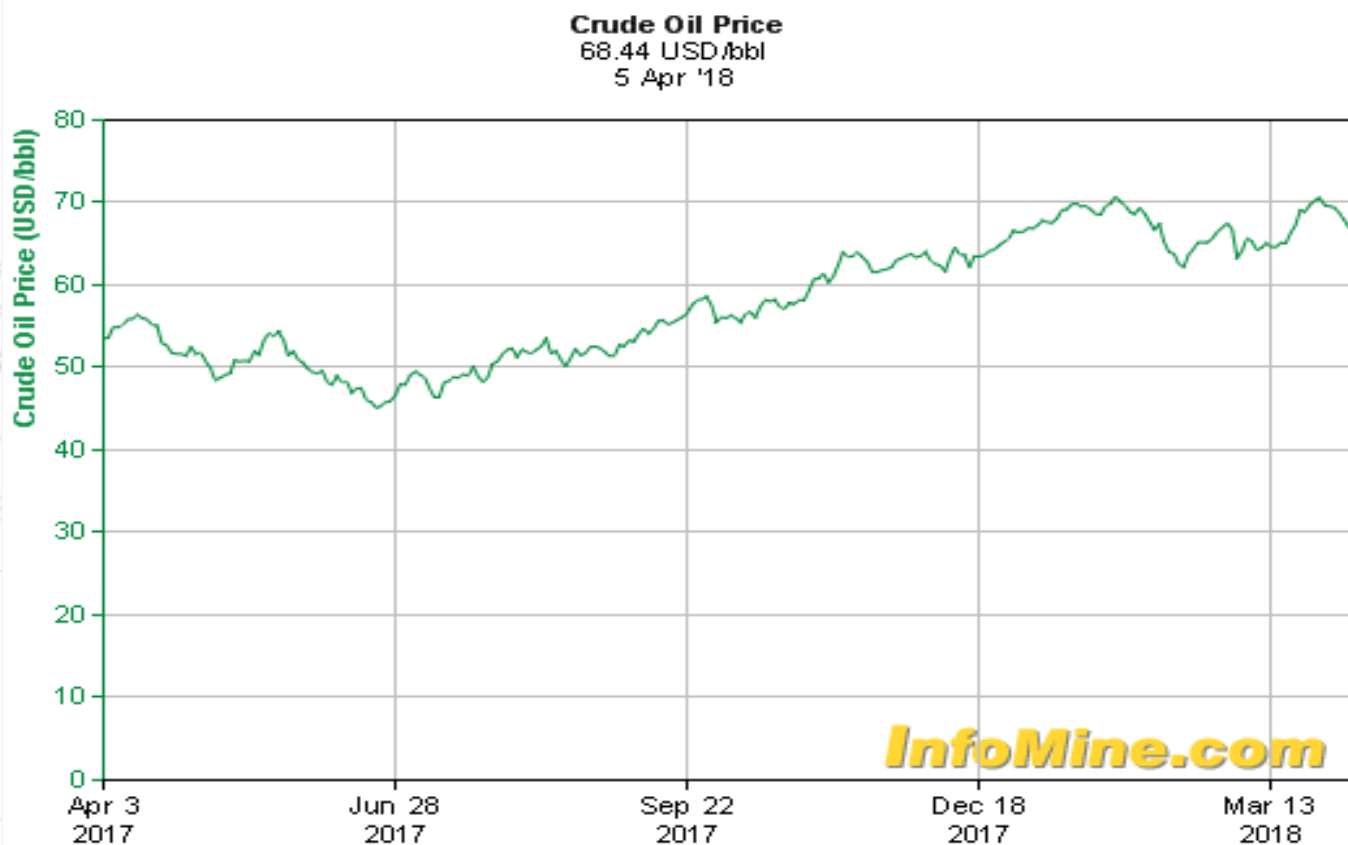
	Pricing	Lead Time	Supply	General Lead Time
PCB	Increases	Increases	No constraints	8-12 weeks
Cable	Increases	Stable	No constraints	6-14 weeks
LCD	Stable	Stable	No constraints	6-10 weeks

- PCB Lead Time increased by 2 weeks, pricing increasing up to 10%

## OIL – Plastic, Transportation, utilities

- \ OPEC daily basket price stood at \$65.18 a barrel Thursday, 5 April 2018
- \ At 0955 GMT, ICE June Brent crude futures were at \$68/b from Thursday's \$68.33/b settle and the NYMEX May light sweet crude contract was at \$63.24/b, from Thursday's settle of \$63.54/b.
- \ Although crude fundamentals globally provided elements of price support, the geopolitical issues and reactions of equities markets were influencing the oil markets.
- \ Saudi Arabia this week intercepted a missile targeting its new 400,000 b/d Jizan refinery, while oil market participants raised concerns about shipping in the Red Sea and potential disruptions to supply after a Saudi oil tanker carrying about 2 million barrels of crude came under attack earlier this week.
- \ In the US, bottlenecks in the crude pipeline systems were occurring earlier in the year than expected, which has the potential to impact Permian production and ultimately US supply, Torbjorn said
- <https://www.platts.com/latest-news/oil/london/crude-oil-futures-under-pressure-on-ongoing-geopolitical-26931850>

## Crude Oil Price



## COPPER – PCB, Cables, Connectors, LCD

- \ Sustained growth in copper demand is expected to continue because copper is essential to economic activity and even more so to the modern technological society
- \ Copper's critical uses make it the most precious of the base metals. Its important role in technological advancements will fuel strong demand
- \ The first factor is that the world economies, including in the US and in Europe, are actually perking along rather well : "Yes, the Chinese economy is not as robust as it has been in the past, but it is still growing at an annual rate of 6 or 7 percent" Culver told the Investing News Network (INN). "The second factor is that as technology evolves so do the primary uses of copper, and the electric vehicle industry is an example of that. And third, we are using more copper than we have coming on-stream. The demand is increasing steadily and the supply has not caught up."

<https://investingnews.com/daily/resource-investing/base-metals-investing/copper-investing/copper-fundamentals-driving-technological-economic-growth/>

## Copper Price



## GOLD – CONNECTORS, PCB, PLATING

- \ Gold demand rallied in the closing months of 2017, gaining 6% year-on-year in Q4 to reach 1,095.8 tonnes (t). However, overall demand for the full year fell by 7% to 4,071.7t, compared with 2016, according to the World Gold Council's latest Gold Demand Trends report.
- \ The technology sector recovered in 2017, up 3% to 333t compared with 2016, ending a 6-year downtrend. The volume of gold used in electronics and other industrial applications grew steadily throughout the year, thanks to the increasing prevalence of new-generation features in smartphones, vehicles and laptops.
- \ Mine production inched to a record high of 3,269t in 2017, while recycling fell 10%, leading to total supply dipping 4% to 4,398t. The introduction of stringent environmental controls in China led to a 9% fall in mine production in the region, whilst the ongoing concentrate exports ban continued to impact output in Tanzania. Total net de-hedging in 2017 reached 30t, bringing to an end three consecutive years of modest net hedging.

<https://www.gold.org/news-and-events/press-releases/q4-recovery-fails-to-mitigate-full-year-declines-in-2017>



## Gold Price

**Gold Price**  
1,331.44 USD/ozt  
6 Apr '18



## RAW METAL – FABRICATED METALS

The year 2017 closed with a net increase in world steel production. This is borne out by the World Steel Association data (between January and November output rose by an annual 5.4%, to a total 1.53 billion tons). Global consumption also showed clear signs of growth in 2017.

The year 2018 is also set to be an essentially positive year for steel. Raw materials used by the steel industry, nickel prices are expected to rise in the coming months.

Prices of iron ore and carbon coke are expected to fall. According to forecasts by the international financial bodies, the former “will drop by between 8.5% and 28.5% in 2018 from 2017 levels, and subsequent years will see further contractions

The prospect of 25 percent U.S. tariffs on steel imports has raised fears of a global trade war but steel producers outside North America believe they can weather the storm without too much disruption to their business or steel prices.

While the United States imported 36 million tons of steel in 2017, with Canada, Brazil and South Korea the leading suppliers, that was less than 8 percent of global steel market traded volumes of 473 million tons during the year.

Source : [worldsteel.org](http://worldsteel.org)

## PCB

- \ The future of the printed circuit board (PCB) market looks promising with opportunities in the communication, computer/peripheral, and automotive industries. The global printed circuit board market is expected to reach an estimated \$72.6 billion by 2022 and is forecast to grow at a CAGR of 3.2% from 2017 to 2022. The major drivers of growth for this market are the strong demand for smart phones and tablets along with growing automation in industries, such as automotive and aerospace & defense.
- \ Emerging trends, which have a direct impact on the dynamics of the industry, include the miniaturization of printed circuit boards and development of green PCBs
- \ Predictions that the demand for rigid flex PCBs is likely to experience the highest growth in the forecast period supported by growing demand for smartphone and display applications.
- \ Capacity may be an issue as the demand increases.  
<http://www.lucintel.com/global-pcb-market-2017-2022.aspx>

## Aluminum Price

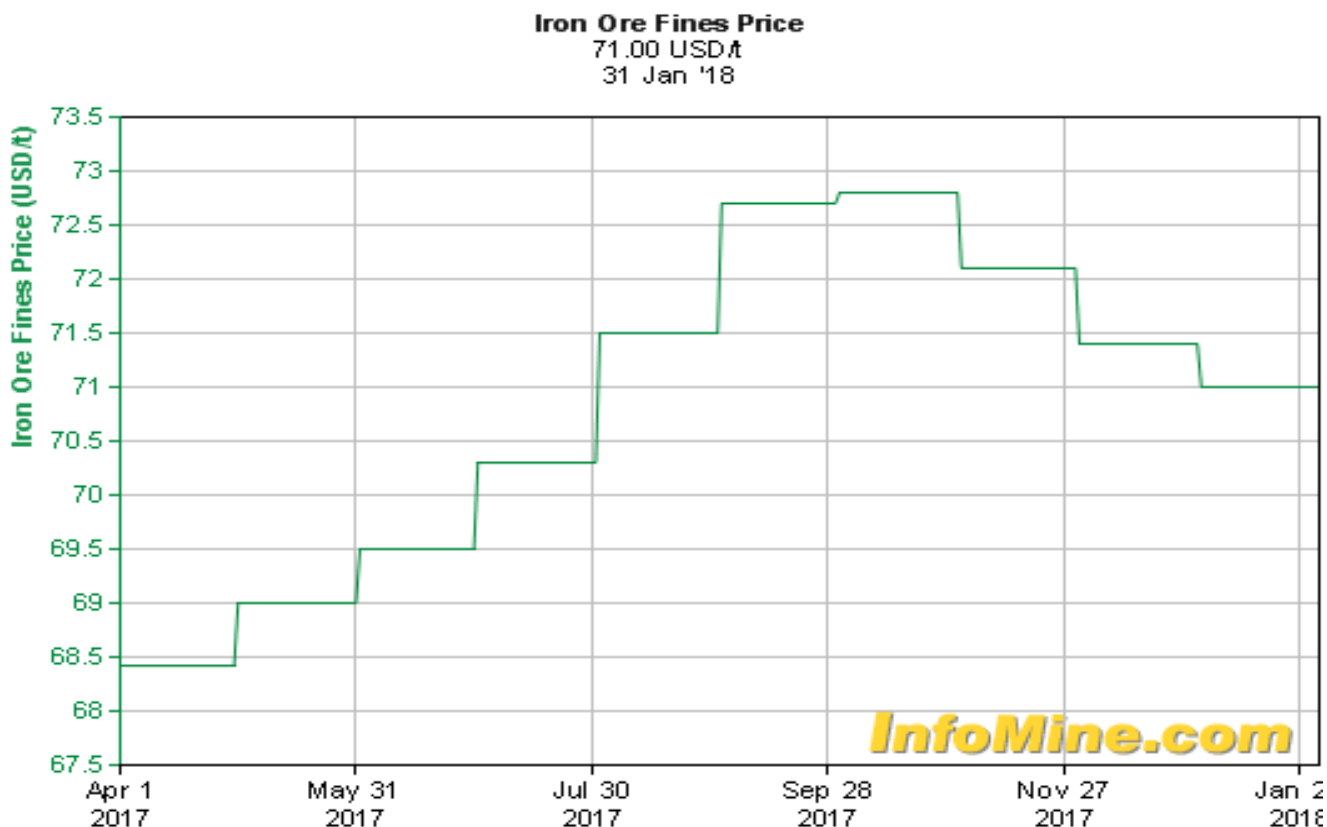
### Aluminum Price

0.89 USD/Mb

4 Apr '18



## Iron Ore Fines Prices



## 2018 Airfreight Market Outlook

- \ 2017 was the strongest year for airfreight demand since 2010 with 2.2 million tons of additional cargo flown compared to 2016.
- \ Close to 70% of the additional cargo flown came from Asia (1.0 millions tons) and Europe (840 thousand tons).
- \ Absolute growth in 2017 has been stronger than the total absolute growth from 2010 to 2016 combined.
- \ As a result the overall market has turned into a sellers' market, in particular for traffic outbound Asia Pacific and Europe.



## Capacities

- \ Global capacity growth has been outpaced by demand growth throughout 2017 with no additional freighter capacities.
- \ Existing freighter capacities need to serve general airfreight and the continuously growing e-Commerce market.

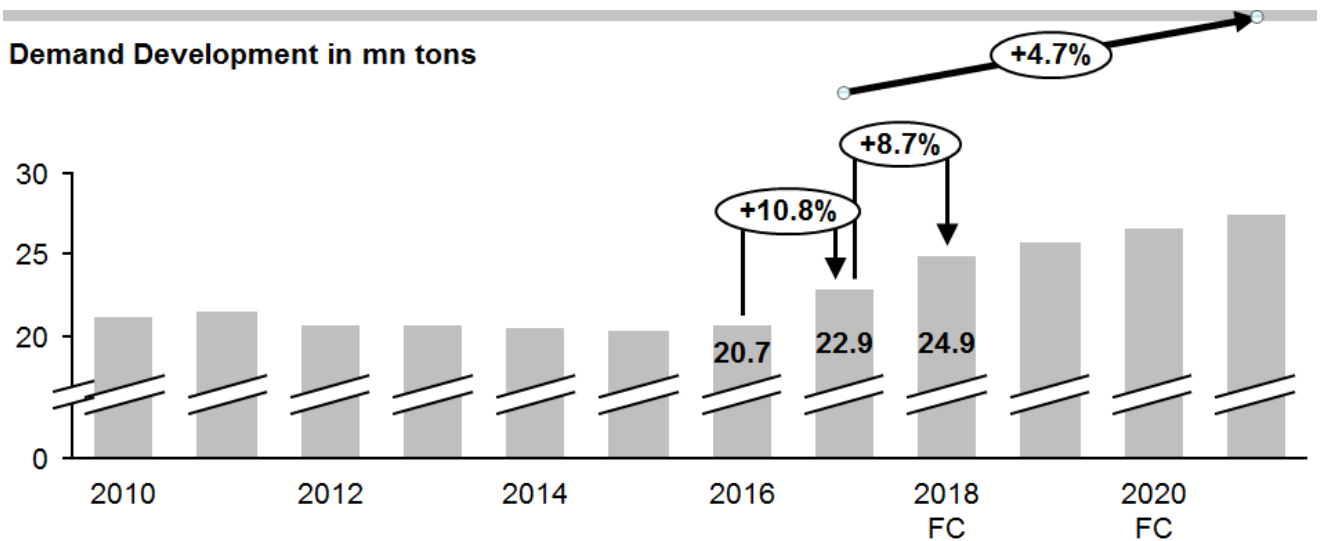
## Carriers

- \ Carriers strategically limit the share of capacity allocated to BSAs in sight of further demand increases in the year to come.
- \ Access to freighter capacities are the key for freight forwarding markets in 2018

## Jet Fuel

- \ Jet fuel price increased by +25.3% during the course of 2017 to a high since mid-2015 of 81.30 USD per barrel.
- \ The increase in jet fuel price is a result of increasing demand for airfreight.

## Airfreight Market Outlook



## Market Developments on Key Trade Lanes

			Q1'18			Q2'18		
			Jan	Feb	Mar	Apr	May	Jun
ASPA	→ Intra		●	●	●	●	●	●
	→ AMNO		●	●	●	●	●	●
	→ EURO		●	●	●	●	●	●
EURO	→ ASPA		●	●	●	●	●	●
	→ AMNO		●	●	●	●	●	●
	→ AMLA		●	●	●	●	●	●
AMNO	→ ASPA		●	●	●	●	●	●
	→ EURO		●	●	●	●	●	●
	→ AMLA		●	●	●	●	●	●
AMLA	→ EURO		●	●	●	●	●	●
	→ AMNO		●	●	●	●	●	●

- \ Available capacities in intra-ASPA continue to be very limited. High demand on all key lanes outbound ASPA
- \ Demand for airfreight on EURO-ASPA remains high with no additional capacity on the market
- \ Inbound South Pacific traffic continues to be restricted. Freighter cancellations on AMNO-EURO
- \ No cargo flow disruption expected, except on AMLA-AMNO shortly before Mother's Day in the US.



No cargo flow disruption. Normal capacity demand



Demand for capacity is high. Backlogs forming



Demand Exceed capacity. Upward pricing pressures



**THANK YOU**