

# TEHCET

Electronics Materials Information



## TEHCET's CMC ADVISORY ALERT

Dan Tracy  
Lita Shon-Roy  
Bruce Lipisko

August 18, 2020

# TEHCET's ADVISORY ALERT OUTLINE

- The Semiconductor Material Supply Chain: The Uncertainty Continues—Bruce Lipisko
- An Update on the Semiconductor Materials Markets—Dr. Dan Tracy

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## TEHCET ADVISORY ALERT:

The Semiconductor Material Supply Chain: The  
Uncertainty Continues

Bruce Lipisko  
August 18, 2020

# THE PANDEMIC IS NOT OVER

- Cases are spiking especially in the United States
- Local restrictions recently eased are being re-imposed
- International travel restrictions (quarantine) remain in effect
- International air travel is limited and expensive
  - US to China: ~\$5-10K

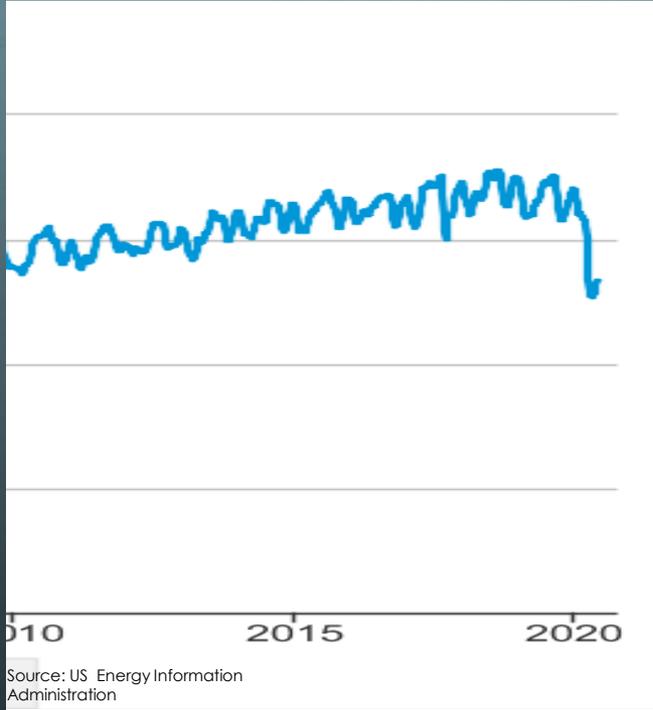


# “RED FLAGGED” MATERIALS & SERVICES APPEAR STABLE

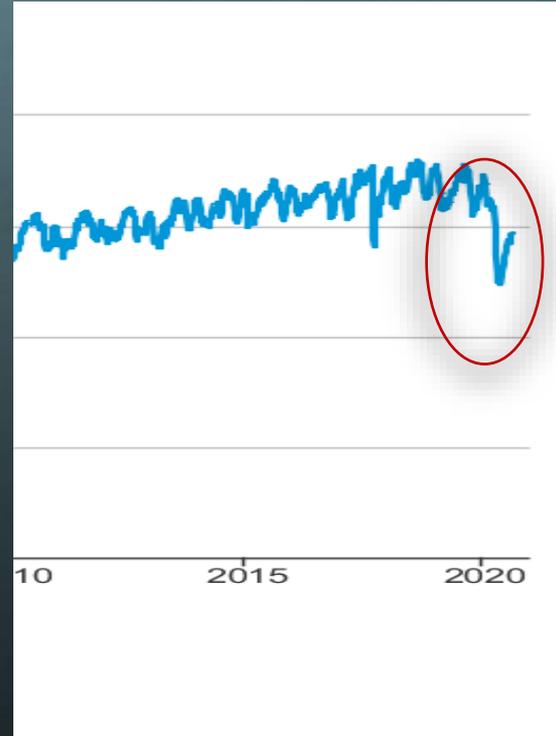
- Significant PPE shortages did not materialize
- IPA shortages were sporadic, regional & short-lives
  - Sequens/France lifts force majeure
- General sulfuric acid shortages have not occurred
  - Pricing highly variable
- Logistics is meeting demand and getting better



# 4-WEEK AVG US REFINER NET INPUT OF CRUDE OIL



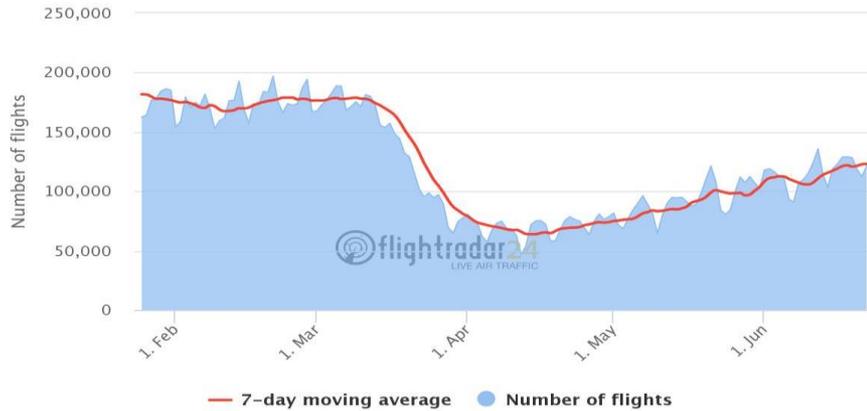
May 2020



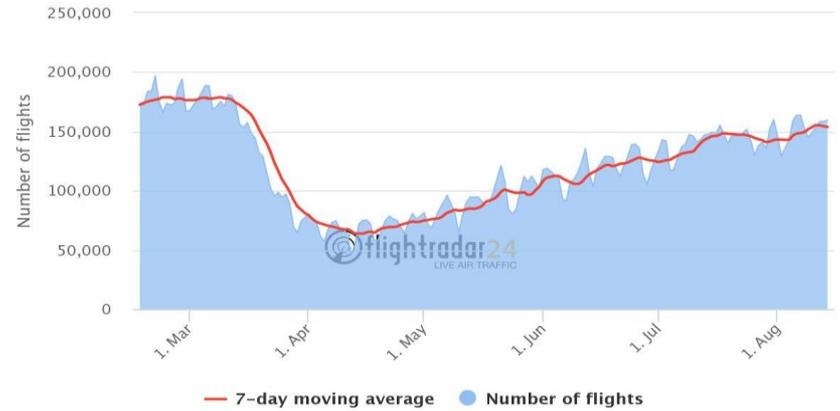
July 2020

# GRADUAL IMPROVEMENT IN FLIGHT TRAFFIC INDICATES IMPROVING CONDITIONS

Total number of flights tracked by Flightradar24, per day (UTC time), last 150 days.



Total number of flights tracked by Flightradar24, per day (UTC time), last 180 days.



# BUT....

- The impact of schools re-opening on PPE and IPA is an unknown:
  - 50 million primary and 20 million university students in the US alone
- The decreased demand for fuel continues to impact refineries
  - Closure in Martinez, CA



# THE GENERAL CONSENSUS

- Surveyed CMC members did not believe the pandemic caused major problems but rather exacerbated existing issues
- A major issue impacted by the pandemic is De-Globalization/Localization
- Numerous national governments are investing significant amounts to assist local production
  - China: \$29 Billion Fund
  - US: \$23 Billion Fund or \$10 Billion annually
  - Korea: ~\$1 Billion annually
- IDMs/Foundries inviting current suppliers to join them in expansion
  - TSMC and Taiwan Specialty Chemicals Corp

# PREVIOUSLY IDENTIFIED STRUCTURAL ISSUES REMAIN

- Ongoing trade & tariff disputes and the impact of US elections
- The push for local manufacturing especially in China and Korea:
- Expansion plans by multiple Asian material suppliers
- The involvement of private equity and hedge funds
- The increasing competitive advantage of solid Tier II suppliers



# TEHCET ASSESSMENT

- The pandemic is not over regardless of the current apparent stability
- Major structural problems exist with some exacerbated by the pandemic
- There will be winners and losers

# TEHCET

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# TEHCET's CRITICAL MATERIALS MARKET UPDATE

**Dan Tracy**

Sr. Director  
August 2020

CMC Advisory Alert Meeting

# Dan Tracy, PhD

## TEHCET Senior Analyst

- 🌐 Director of Market Research & Sr. Analyst of TEHCET— covers sputtering targets and deposition materials, Si wafers and is also in charge of training programs.
- 🌐 He has over 20 years of experience in the electronics industry covering supply-chain topics related to semiconductor packaging, thin films, semiconductor process equipment, and semiconductor materials.
- 🌐 He has experience as the senior director of the Industry Research & Statistics group at SEMI and at Rose Associates.
- 🌐 He holds a Ph.D. in Materials Engineering from Rensselaer Polytechnic Institute, a M.S. in Materials Science & Engineering from Rochester Institute of Technology, and a B.S. in Chemistry from SUNY College of Environmental Science and Forestry



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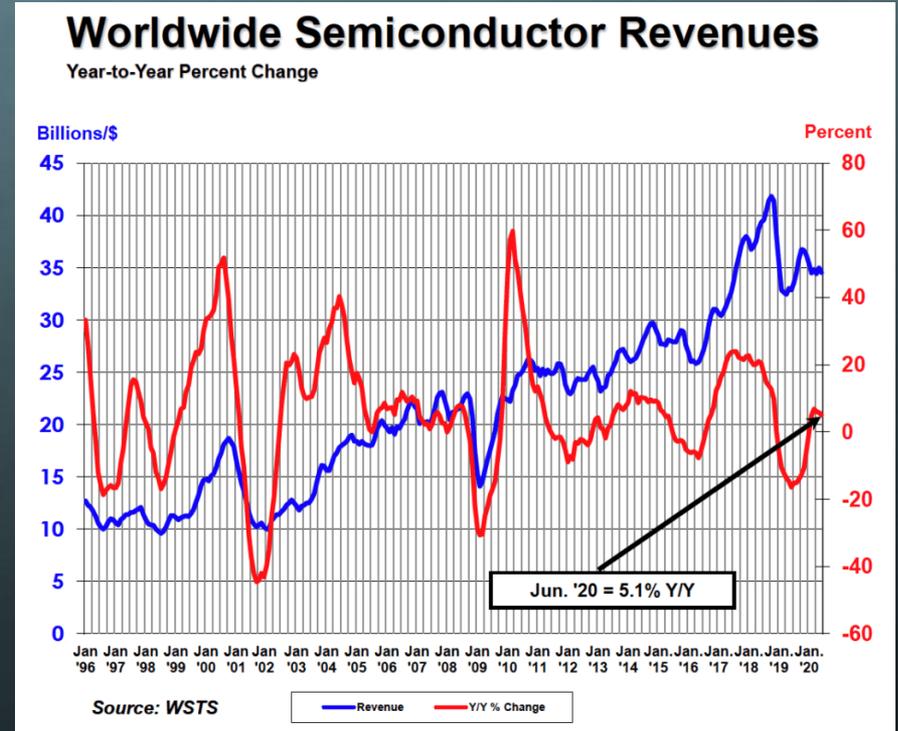
# OVERVIEW

- Quick Industry Update
  - Uncertainty reigns in 2020 semiconductor outlook
  - However, semiconductor industry is forecasted to see net positive growth for the year
- Material Market and Forecast
  - Wafer starts to increase 1.6% this year and another 4.7% in 2021
  - Overall materials market 2020 roughly flat vs. 2019; grow by 4.6% in 2021
  - Forecasting +1.4% bare wafer shipment growth in 2020; +5.8% growth in 2021
- Summary

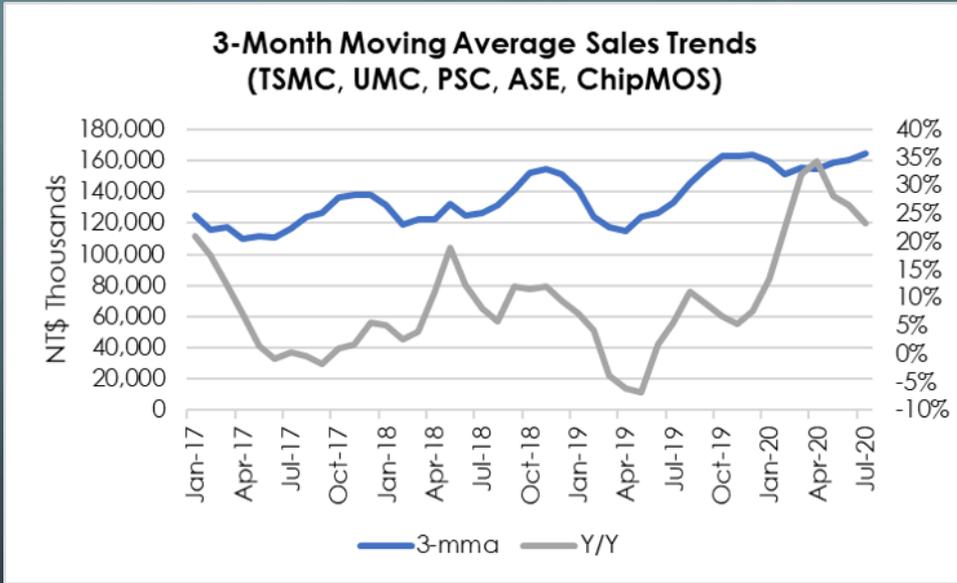
# Industry Update

# SEMICONDUCTOR SALES

- 2Q 2020 sales up 5.1% Y/Y; down -1% Q/Q (SIA Aug. 3<sup>rd</sup> press release)
- Global semiconductor sales decreased -0.3% in June vs. May.
- June 9<sup>th</sup>, the WSTS issued its Spring 2020 semiconductor revenue forecast
  - Forecasting +3.3% growth for 2020
  - +15% for Memory; +2.9% for Logic
  - 2021 growth at +6.2%



# TAIWAN MONTHLY SALES



- Taiwan public companies are required to report monthly sales which can be used as an indicator of the foundry market and overall semiconductor growth trend
- 3-month average of total monthly sales for TSMC, PowerChip, UMC, ASE, and ChipMOS showing overall upward growth trend so far in 2020
- Combined year-to-date sales through July are up +27%
  - Non-TSMC total is +16%
- 3Q Outlook
  - TSMC up +9%
  - ASE and UMC flat

# 3Q OUTLOOK

- COVID-19 Impact on Forecasts: The semiconductor industry has been somewhat insulated thus far from the ongoing economic downturn. Although demand for semiconductor devices reliant on the automotive industry has declined, overall wafer starts growth is net positive to date.

This growth stems from increased demand for chips that support the computing and server markets, driven by work & school from home initiatives. This net positive trend will continue uncertain and highly reliant on continued government stimulus, which has thus far buoyed up consumer spending.

# HIGHLY DYNAMIC MARKET TO FORECAST

End of April 2020



End of July 2020



**Segment**

**1H2020/1H2019**

**Semiconductor Device Sales**

**+6%**

**Silicon Wafer Shipments**

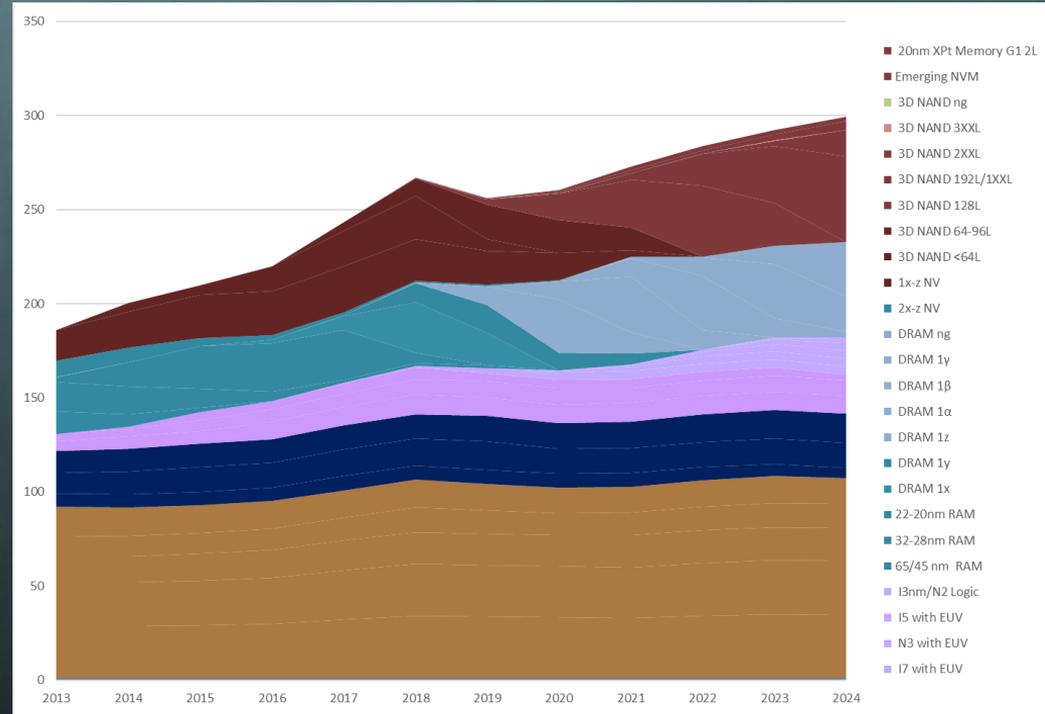
**+1%**

**Equipment Spending**

**+18%**

# TEHCET WAFER STARTS BY TECHNOLOGY NODE AND DEVICE TYPE

- TEHCET is forecasting +1.6% wafer start growth in 2020 and +4.7% growth in 2021
- The multiple layers required for 3DNAND stairsteps drive volume demand for all materials:
  - 1.6% CAGR through 2024 expected
- DRAM device growth will be boosted by 1z production ramp scheduled for 2020:
  - DRAM advanced nodes are expected to grow 3.6% through 2024.
- Mild 2020 growth for logic device advanced nodes is also expected
  - Highest growth area will be EUV nodes where wafer starts will grow at a >40% CAGR through 2024.

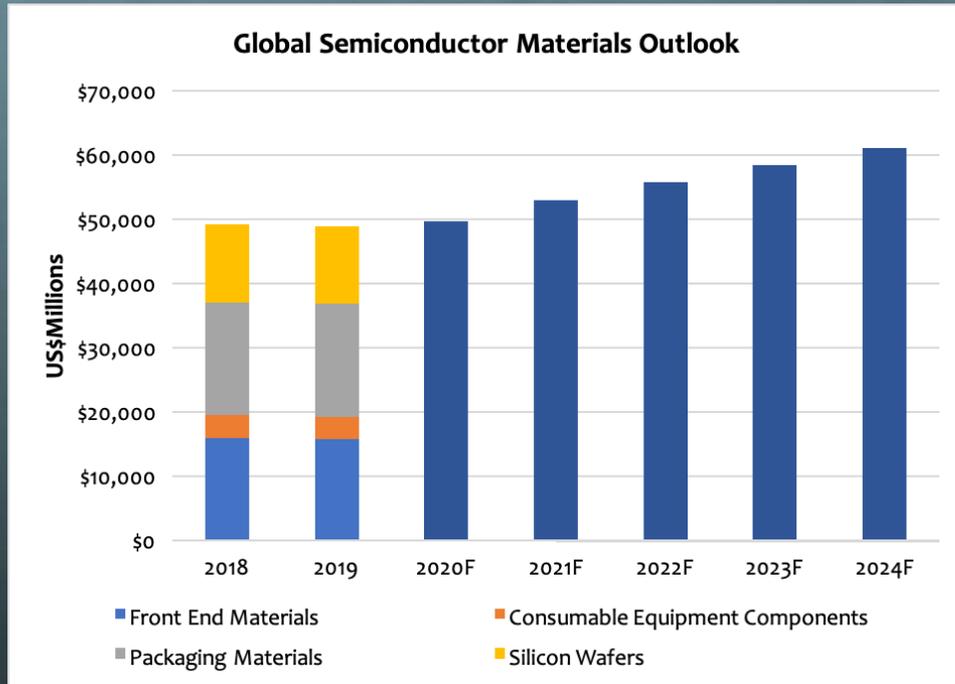


# TEHCET's Outlook

- Despite the global economic slowdown and uncertainty surrounding the COVID-19 pandemic, the global semiconductor industry outlook has improved and 2020 is now forecasted to be a growth year over 2019.
- 2020 semiconductor Industry revenues could increase up to 6% for the year
  - Recovery in memory ASP is a key factor in the improved revenue growth outlook
  - Growth is forecasted for 2021 as well as data center and 5G applications drive market demand
- TEHCET now forecasting 1.6% wafer start growth in 2020
- The introduction of new nodes in TEHCET's forecast mirrors the HVM schedules called out in technology roadmaps, showing healthy growth for 2020 in the memory sector. As we move forward in time, these ramp schedules may be adjusted to accommodate future changes following any new announcements or information obtained from our ongoing market research.

# MATERIALS OUTLOOK

# TEHCET'S SEMICONDUCTOR MATERIALS OUTLOOK



- Forecasting 1% revenue growth in 2020 to reach US\$49.4 billion
- Almost 7% revenue growth in 2021 to reach US\$52.8 billion
- Strongest growth over the forecast period for precursors, CMP consumables, advanced photoresists, SOI wafers, specialty cleans, and specialty gases
- Front-end materials to grow over 5% CAGR over the forecast period

# MATERIALS MARKET ASSESSMENT

- Material supply chains are stable, with pandemic induced logistic issues improving
  - Some concerns exist that safety stock ordering will eventually lead to inventory correction / downturn in 4Q; however, our contacts indicate ordering has leveled off and appears stable
- Growth in the memory sector and leading-edge logic is inching up demand for some materials, especially materials that cater to 128L+ and <10nm logic
  - 3DNAND scaling and advanced logic ramp drives growth in segments for CMP, wet process chemicals, and precursors
- Epitaxial wafer for advanced logic and SOI are strong growth segments, leading wafer shipment growth in the forecast years
- Prospects for materials consumption remain positive in the longer term with new applications in 5G, high-performance computing, automotive, and other emerging markets ramp.

# MATERIALS MARKET ASSESSMENT

## - CONTINUED -

- With the start of 3Q, it appears the semiconductor industry was insulated thus far from the ongoing economic downturn:
  - Although demand for semiconductor devices reliant on the automotive industry has declined, overall wafer starts growth is net positive to date.
  - Growth is from increased demand for chips that support the computing and server markets, driven by work & school from home initiatives.
  - This net positive trend will continue uncertain and highly reliant on continued government stimulus, which has thus far buoyed up consumer spending.
- Financial institutions (IMF and World Bank) continue to forecast significant GDP downturns for advanced economies, which may come to bear on the semiconductor industry come 4Q2020
  - Stimulus packages will continue to play a major role in helping to keep economies and consumer spending afloat

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