

Semiconductor Treatment Lessons Learned

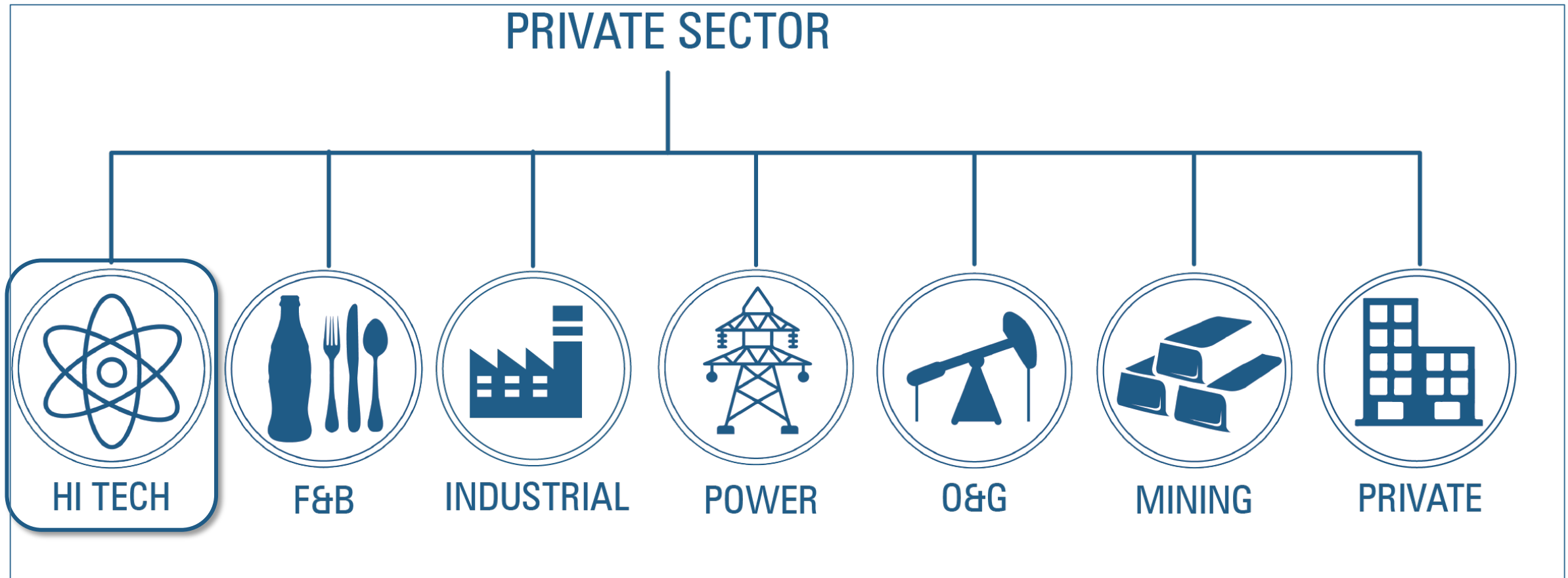
Dave Sobeck



TWCA \ June 15th, 2023



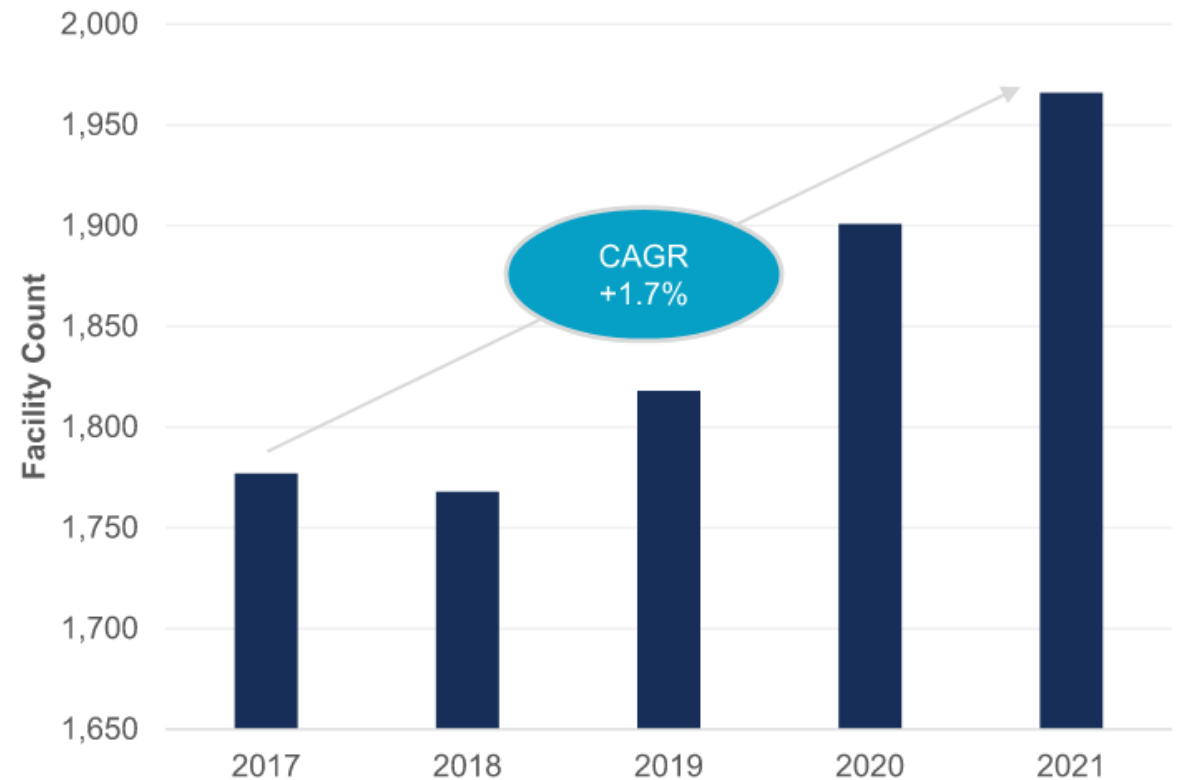
Many Sectors, Many Wastewaters



Growth of Industry/Texas Leadership

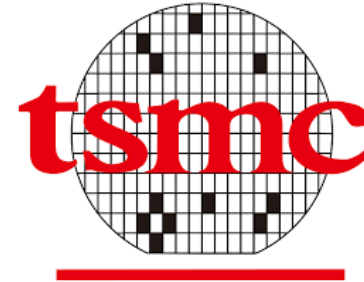
- More data = more demand = more expansion.
- Federal CHIPS and Science Act.
 - » \$280B in funding.
- Texas CHIPS Act.
 - » Texas Semiconductor Innovation Consortium and a Texas Semiconductor Innovation Fund.
- Texas Jobs, Energy, Technology and Innovation Act.
- “Texas ranks number 1 in the United States for semiconductor manufacturing for the expansion of the semiconductor industry.”

U.S. Semiconductor & Related Device Manufacturing Facility Count, Q2 2017–Q2 2021



General Challenges

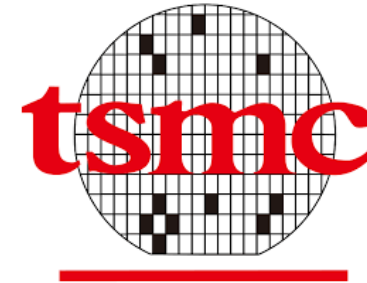
- Industry is notoriously secretive.
- Projections are highly variable over time.
- O&M can be very challenging.
- Lack of strong development agreements/ understanding during initial phases.
- Facility siting in arid/water sparse areas.
- Intense project schedules.
- Skilled labor shortages.
- High project costs.
- Unique/first of kind permitting.



and more...

Water Challenges

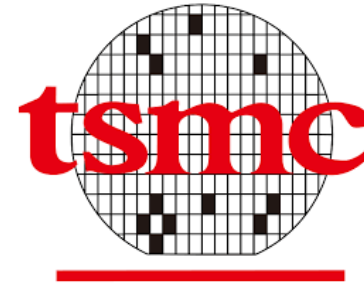
- Average semiconductor facility uses 2-4 MGD of water daily (per megafab).
 - » Chip manufacturing.
 - » Cooling.
 - » Ancillary uses (scrubbing, chems, etc.)
- Water demands increase with each generation of wafer.
- New research driving demand for higher water quality (vs. potable).



and more...

Wastewater Challenges

- Average semiconductor produces 2-4 MGD of wastewater (per megafab).
- Extremely challenging wastewater constituents.
 - » RoT – when flows reach >25% of total, treatment problems are likely.
- Reuse opportunities have historically been limited.
- No “textbook” for design.
- Limited ability to segregate waste streams.



and more...

Water and Wastewater Challenges



Water

Silica
TDS
Hardness
Iron/Manganese



Wastewater

Neutralized Acid Waste
Peroxide Wastes
HF Waste
UPW Brine
Cooling Tower Blowdown
Plating Wastes
Biocides
Corrosion Inhibitors
PFAS
Ammonia

Key Considerations/Success Factors

- Pretreatment programs.
- Performance guarantees.
- Industry ESG programs.
- Ownership and operation of infrastructure.
- Funding of infrastructure.



Takeaways

- Challenges are significant.
- Costs are significant.
- Complexity is significant.
- Traditional approaches likely won't meet the unique demands.
 - » DB/DBO/DBOOM.
 - » P3.
 - » Regional solutions.
 - » Integrated utility/industrial approach (improved resilience).



Questions

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