

RECSiLICON



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James A. May II
CFO, REC Silicon

REC Silicon

A leading producer of advanced silicon materials, supplying high-performance polysilicon and silicon gases to the solar and electronics industries worldwide

PV market



Moses Lake, Washington (USA)

- › Constructed in 1984
- › ~190 employees
- › The first commercial granular polysilicon plant

Semiconductor market



Butte, Montana (USA)

- › Constructed in 1998 (acquired 75% in 2005 and remaining 25% in 2009)
- › ~210 employees
- › World's largest supplier of silane and other specialty gases





PV and semiconductor



Yulin J.V. – China (Associate)

- › Currently in Start-up
- › 15% ownership
- › International operations with presence in China

Products

	Silane Gases	Semiconductor grade polysilicon		Solar Grade Polysilicon
		Czochralski (CZ)	Float Zone (FZ)	
				
Highlights	<ul style="list-style-type: none"> › ~70% global market share › Distributor Model › Lowest cost supplier 	<ul style="list-style-type: none"> › Wafers for semiconductor devices › Long-term supply relationships › Market Dominated by 4 Wafer Producers 	<ul style="list-style-type: none"> › High power semiconductor devices › Long-term supply relationships › Product qualified by major wafer companies 	<ul style="list-style-type: none"> › Lowest cost polysilicon › Unique form factor allows for crucible recharge › Substantial energy saving vs. competitor technology
Markets	<ul style="list-style-type: none"> › Thin film transistor (TFT) displays › Semiconductors › Photovoltaics (PV) 	<ul style="list-style-type: none"> › Mobile Devices › Consumer electronics › Automotive / Aviation 	<ul style="list-style-type: none"> › Power management › Electric motor controls › High voltage applications 	<ul style="list-style-type: none"> › Polysilicon is the base material for PV cells › Target multi-crystalline PV › FBR-B is mono-crystalline capable
Customers	<ul style="list-style-type: none"> › Industrial and specialty gas distributors 	<ul style="list-style-type: none"> › Semiconductor wafer manufacturers 	<ul style="list-style-type: none"> › Float Zone semiconductor wafer manufacturers 	<ul style="list-style-type: none"> › Solar wafer manufacturers
Revenues (2018)	\$99.3 million	\$53.6 million		\$69.2 million
Location	Butte	Butte	Butte	Moses Lake



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BUSINESSES

Butte, Montana Plant

Plant characteristics

- › Commissioned in 1998, acquired by REC in 2005
- › World's largest supplier of silicon gases
- › Manufacturing units with,
 - 80 MT liquid silane storage capacity
 - Silane loading facility
 - Silane ISO Module container fleet

REC is positioned to experience growth

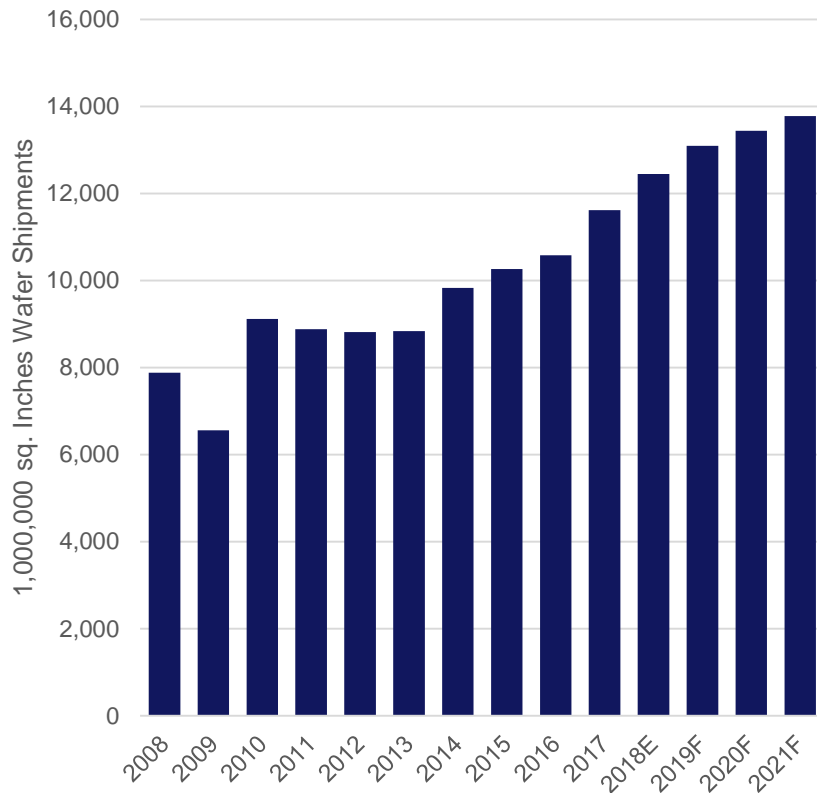
- › Megatrends - Mobility, energy efficiency, and power management
- › High quality requirements and long product qualification processes
- › Dominant silane market share and established distribution channel



Strong Growth in Semiconductor Polysilicon Sales

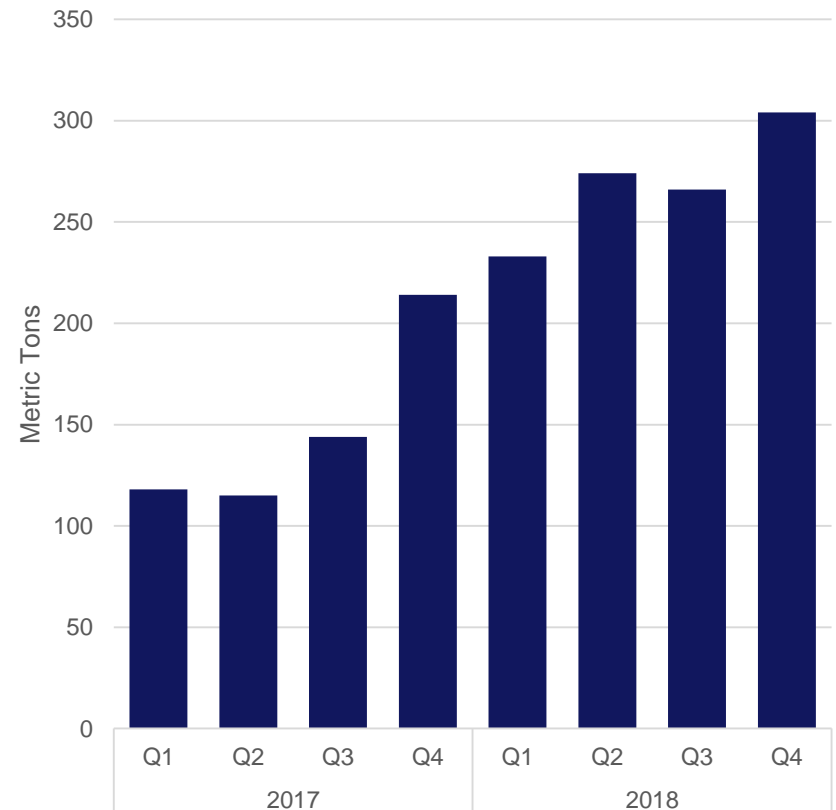
- Long term stable growth market
- REC outpacing market growth short to medium term due to re-entry market

Semiconductor Market



Source: Semi WFF Dec. 4, 2018

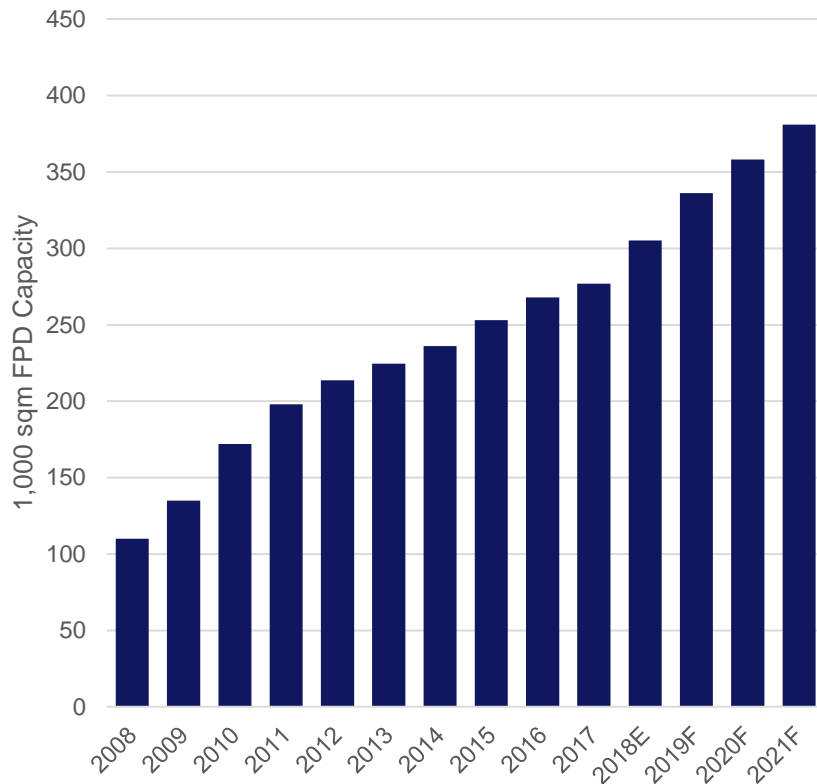
REC Shipments Semiconductor Polysilicon



Strong Growth in High Margin Silicon Gas Market Segments

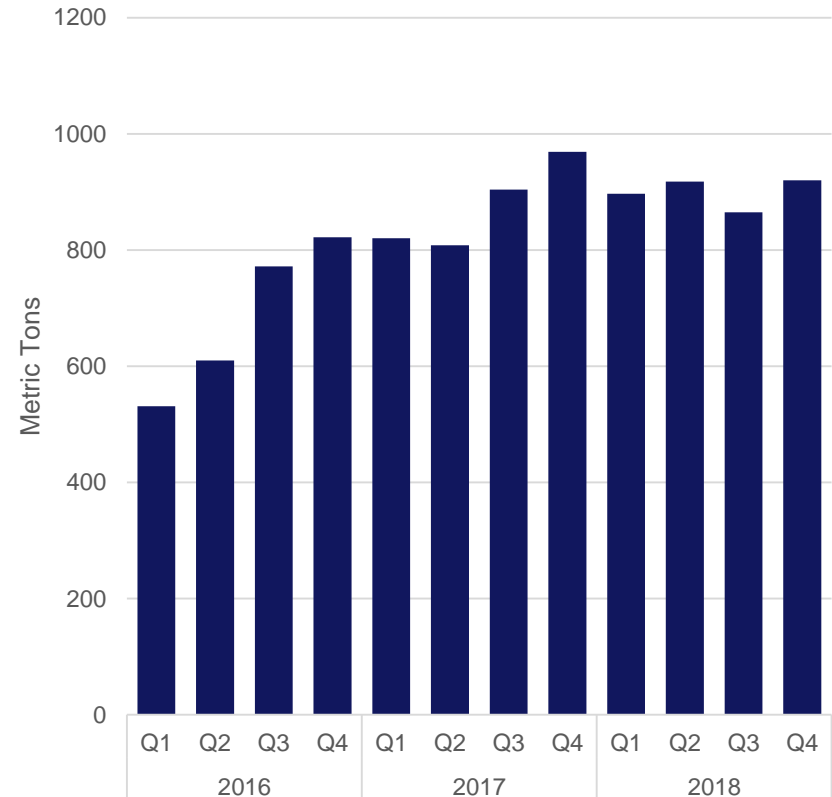
- Silicon gases used in flat panel display (FPD), semiconductor and PV applications
- Robust growth in high margin semiconductor and FPD segments
- PV segment - Low margin and subject to PV market volatility

FPD Market



Source: IHS Supply/Demand Tracker Q3/2018

REC Shipments Silicon Gases



Moses Lake, Washington Plant

Plant characteristics

- › Original construction in 1984
- › Large scale silane units and FBR reactors constructed beginning in 2006
- › ~18,000 MT FBR-A Capacity
- › Proprietary FBR technology
 - Lowest cost of producing solar grade polysilicon



REC is positioned to experience growth

- › Currently operating at 25% capacity due to trade war
- › Ability to quickly increase production with additional market access
- › High growth potential due to PV adoption:
 - Climate change drives need for clean energy
 - Increasing cost competitiveness of solar energy

Fluidized Bed Reactor

Silane Gas (SiH_4)

FBR Technology



NextSi Granular polysilicon



Solar Trade War Update – Uncertainty Remains



Factbox - U.S., China drafting memorandums for possible trade deal

BILATERAL TRADE DEFICIT REDUCTION

Separate from the memorandums, U.S. and Chinese negotiators are discussing a 10-item list of shorter-term measures, largely purchases of commodities and other goods, that China can take to quickly reduce the trade deficit with the United States.

China has offered to buy more U.S. agricultural produce, liquefied natural gas and goods such as semiconductors. China would also reduce its tariffs on U.S.-made polysilicon, a core ingredient in solar cells, two sources familiar with the negotiations said.



Donald J. Trump  @realDonaldTrump · 2d

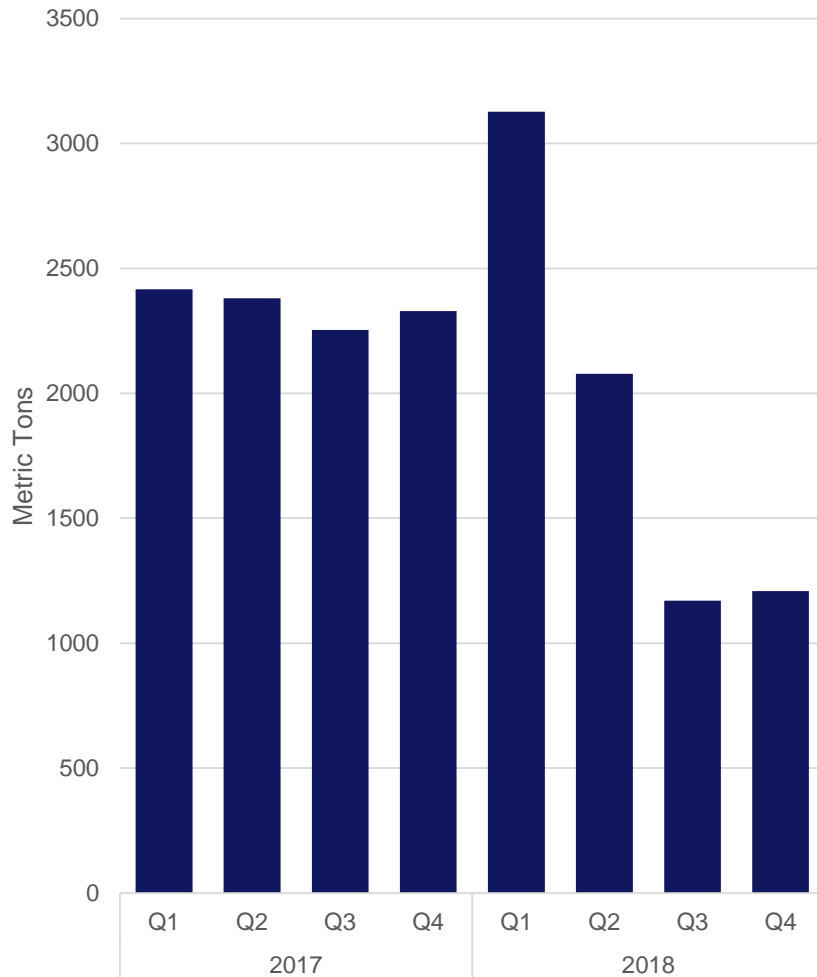
I am pleased to report that the U.S. has made substantial progress in our trade talks with China on important structural issues including intellectual property protection, technology transfer, agriculture, services, currency, and many other issues. As a result of these very.....

....productive talks, I will be delaying the U.S. increase in tariffs now scheduled for March 1. Assuming both sides make additional progress, we will be planning a Summit for President Xi and myself, at Mar-a-Lago, to conclude an agreement. A very good weekend for U.S. & China!

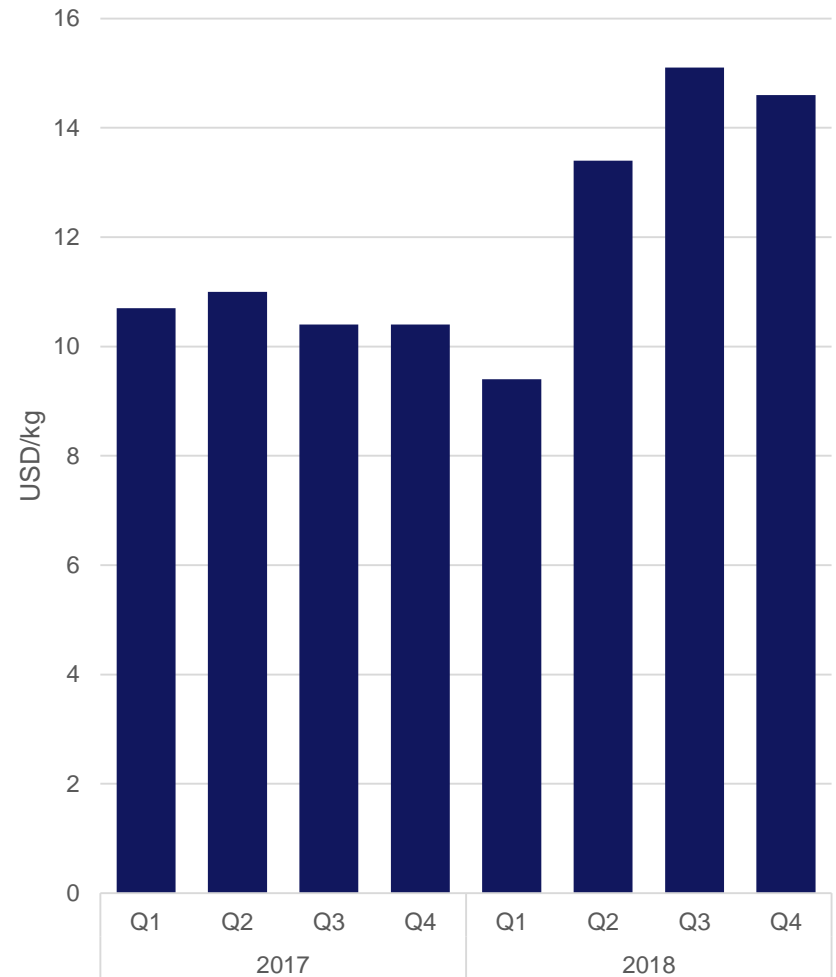
 12.5K  22K  105K 

FBR Low Cost Capability - Despite Low Capacity Utilization

FBR Production Volume



FBR Production Costs

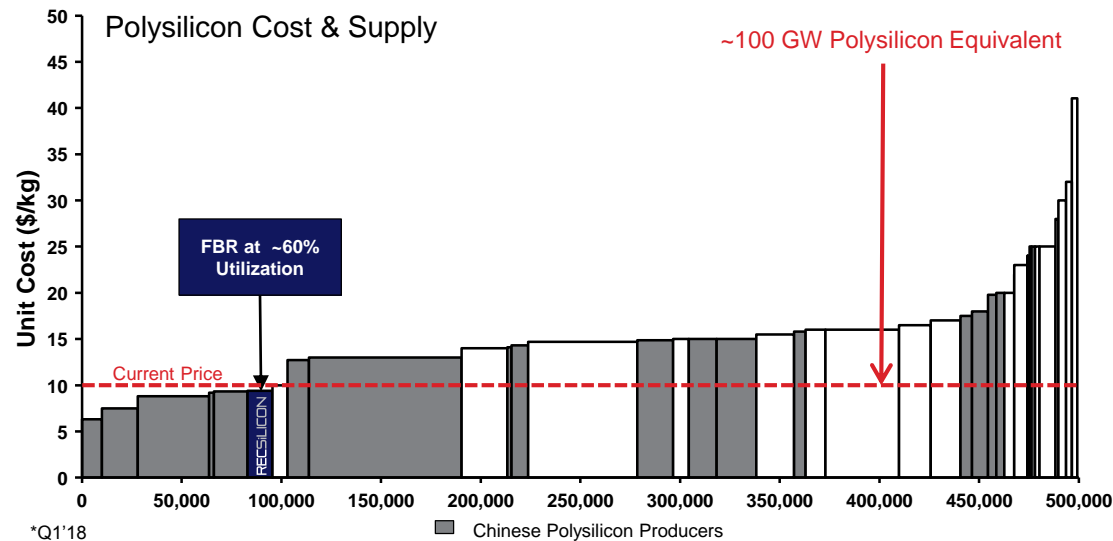
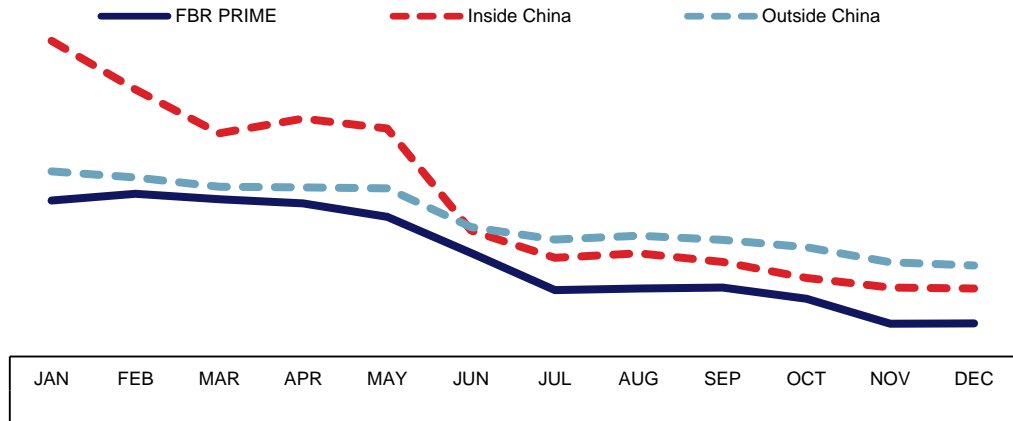


Polysilicon Price Trend

- › China Reduced Financial Incentives for Solar Installations in June 2018
- › Polysilicon Prices in China Dropped by ~55% During 2018
- › Current Polysilicon Sales Prices are Below Cash Cost of Most Producers

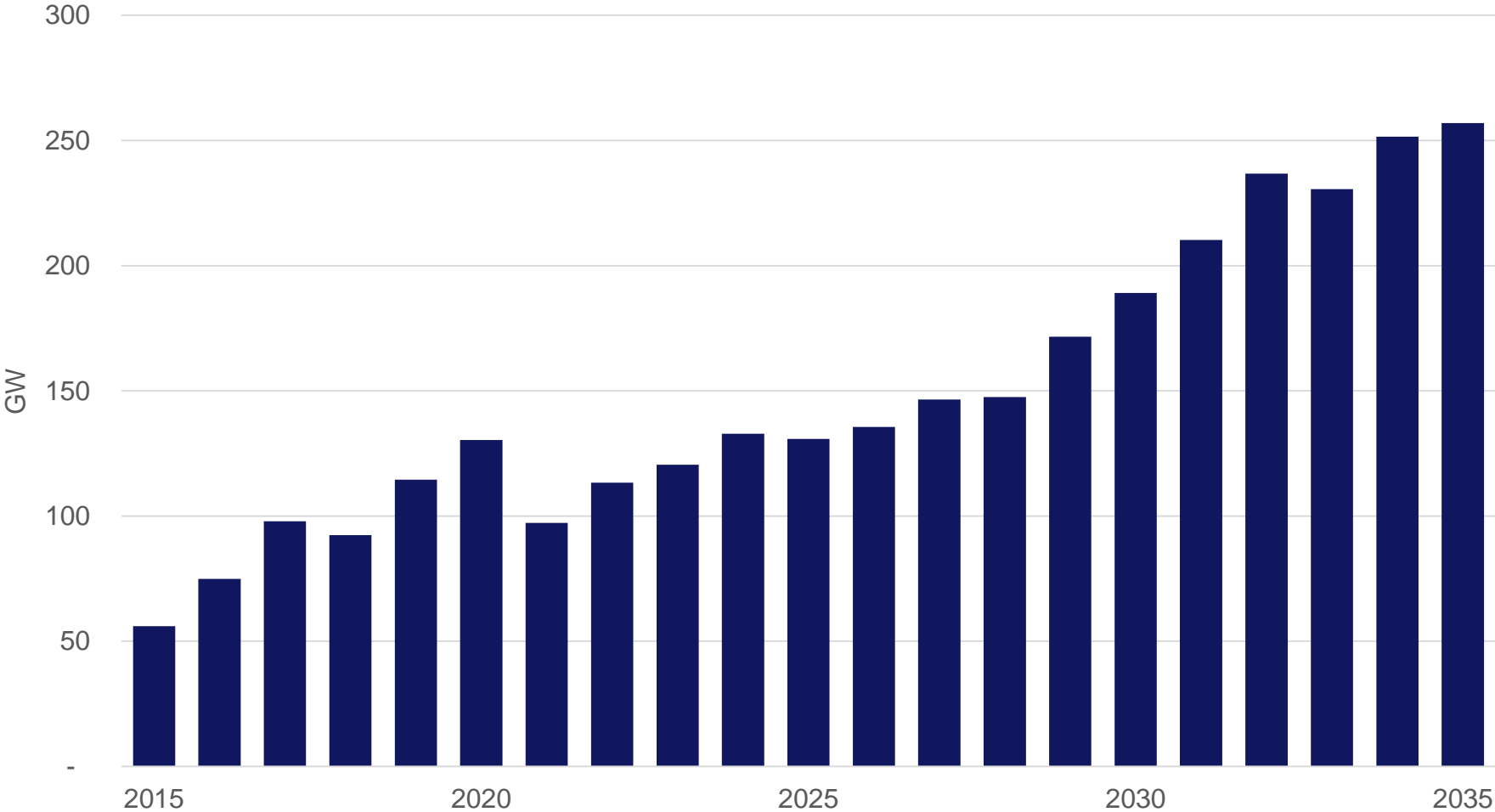
2018 Polysilicon Pricing

Source: PV Insights



PV Market Estimated to More Than Double By 2035

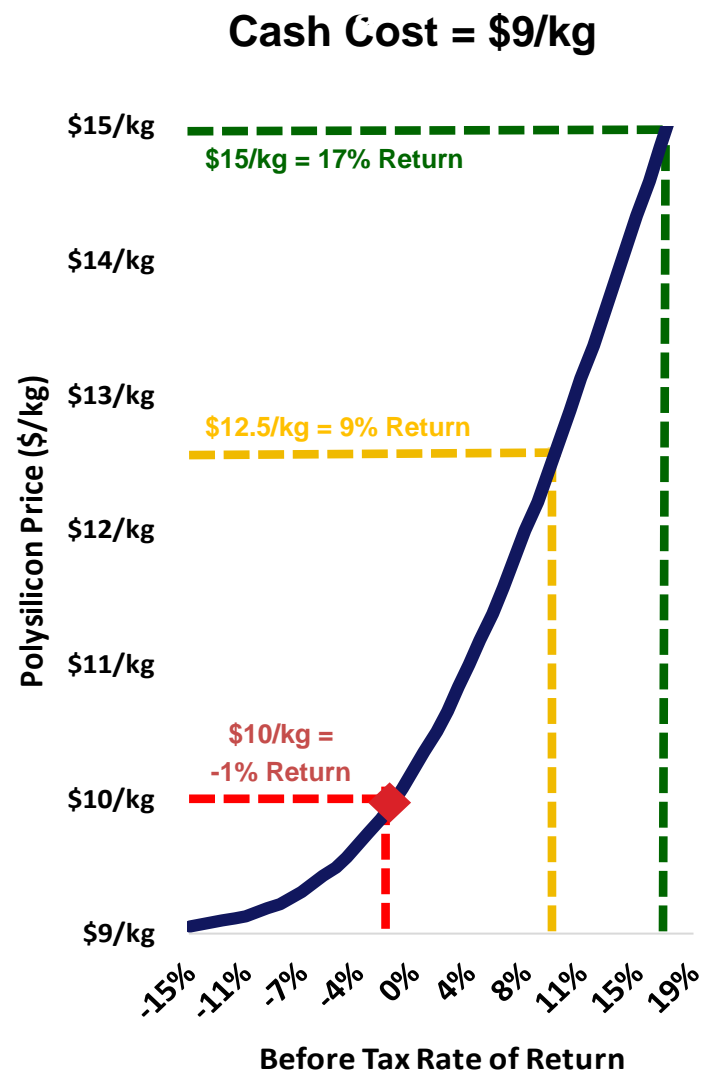
Estimated PV Installations



Source: Bloomberg NEF

Polysilicon Economics

- › Assumptions – Industry Mythology
 - Cost of \$9/kg
 - \$35/kg Capital Cost
- › Polysilicon Price at \$10/kg
 - Negative Return on Investment
 - Will Not Sustain Operations
- › Polysilicon Price at \$15/kg
 - Could Support Expansion Given Assumed Plant Characteristics
- › Higher Prices Required to:
 - Sustain Current Operations
 - Support Industry Expansion





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SUMMARY

Short Term Priorities

- › Mitigate the Impacts of the Solar Trade War
- › Maintain Company Liquidity
- › Focus on Cost Control
- › Manage Inventories
- › Potential Shutdown of FBR to Retain Cash
- › Maintain Manufacturing Capabilities
- › Actively Pursue Resolution to the Solar Trade War

Long Term Opportunities

Semiconductor

- › Stable Earnings Platform
- › Stable Growth Markets
- › Minimal Impact of Solar Trade War

Solar

- › Significant Potential For Growth
- › REC Positioned to Capitalize on Superior Cost Position
- › Opportunities Contingent on Solar Trade War Resolution

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Thank You!
