

# REC Silicon – Nordic Energy Summit 2016

Oslo, 17 March 2016

Jens Ulltveit-Moe, Chairman of the Board

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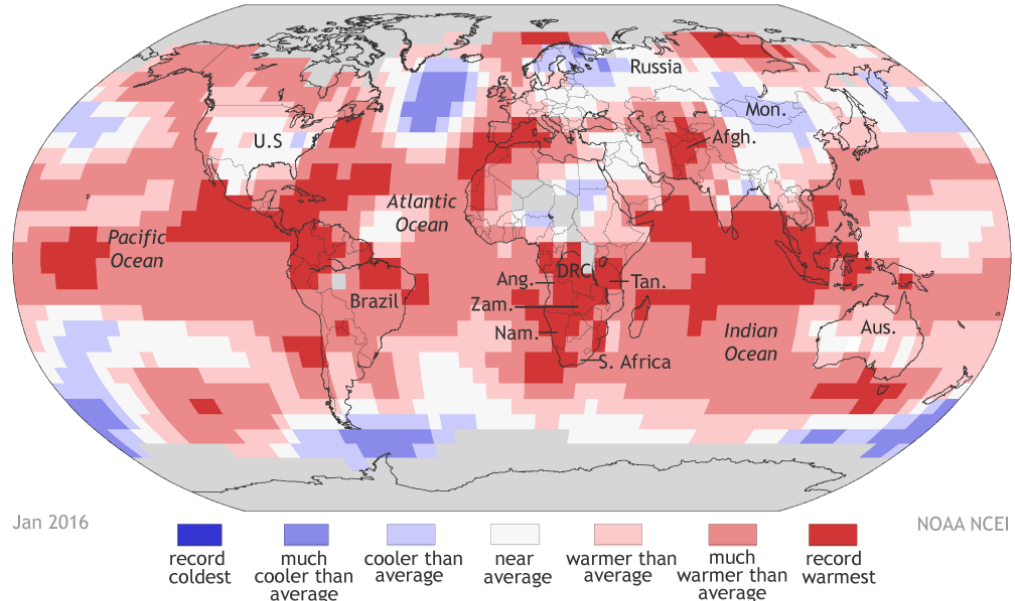
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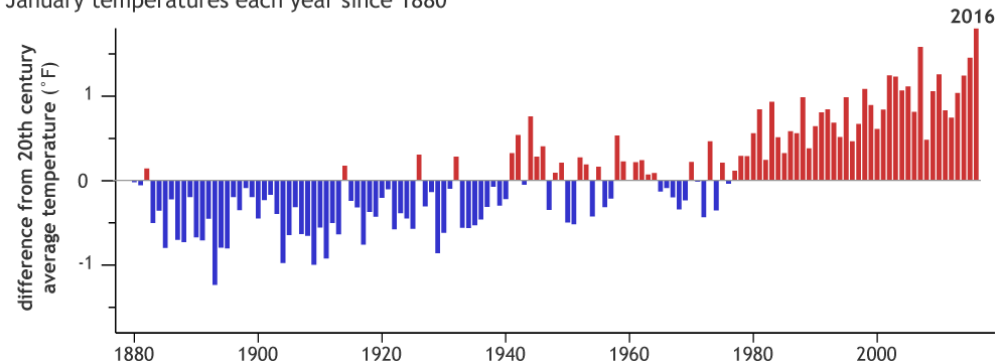
# 15 of the 16 Warmest Years on Record Occurring Since 2001

- › Carbon Dioxide and Global Temperature Levels continue to increase
- › By burning fossil fuels for energy, human activities have increased the concentration of carbon dioxide in the atmosphere by more than 40%
- › Most warming occurred in the past 35 years

January 2016 temperatures compared to historical record



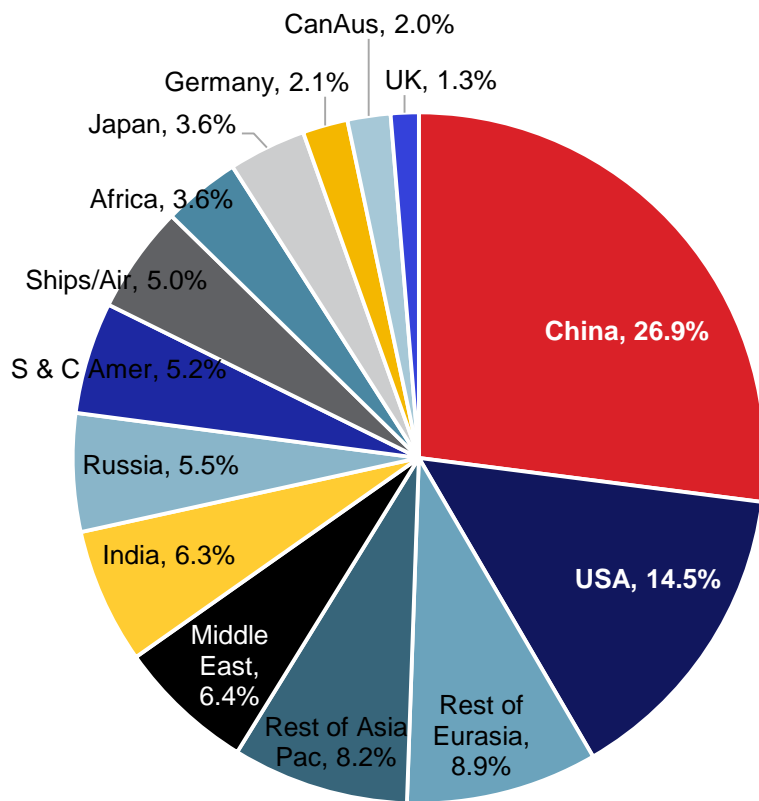
January temperatures each year since 1880



Source: [www.climate.gov](http://www.climate.gov)

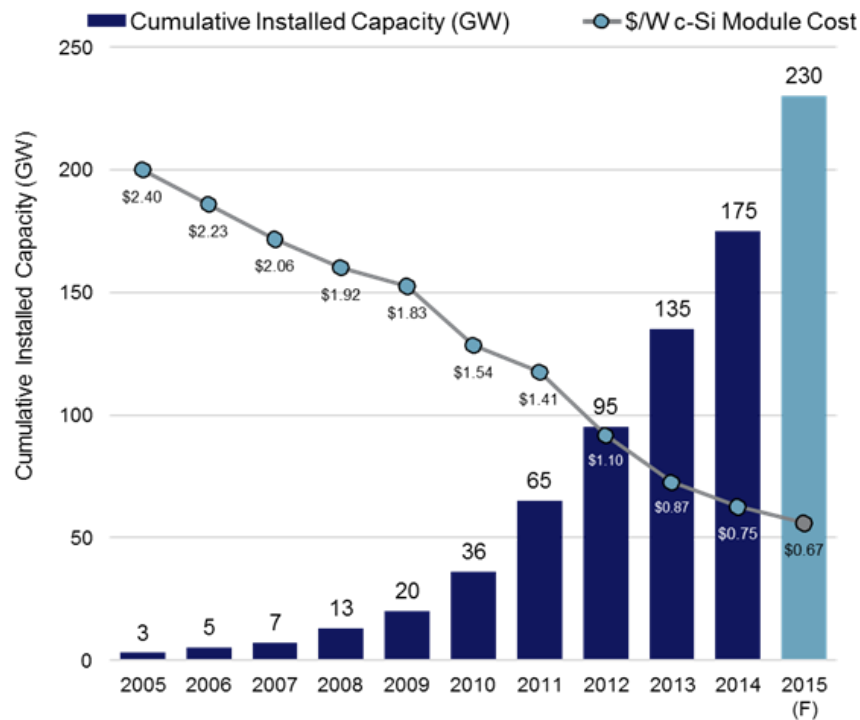
# China and U.S. Largest CO2 Emitters; Solar Becomes Part of Solution

2012 Annual Emissions (9.6 Gt/Cyr)



Source: Carbon Dioxide Information Analysis Center, Oak Ridge National Laboratory, and British Petroleum (8/20/13).

Solar PV Cost vs. Cumulative Capacity

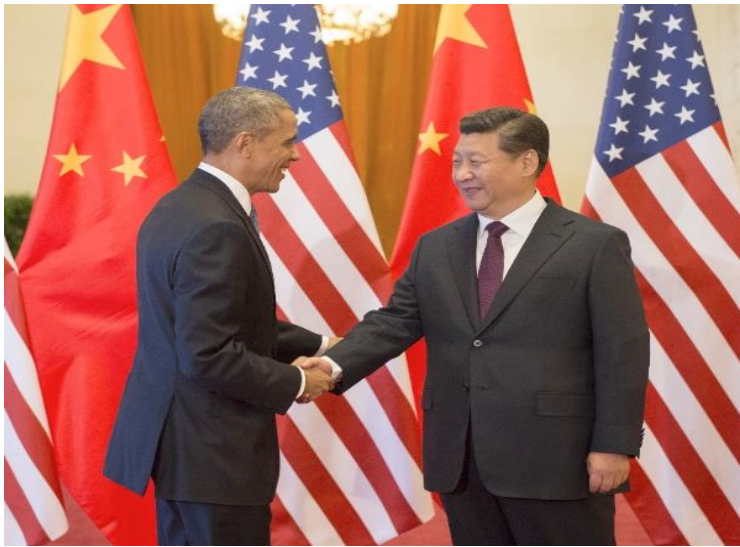


Source: GTM Research April 2015

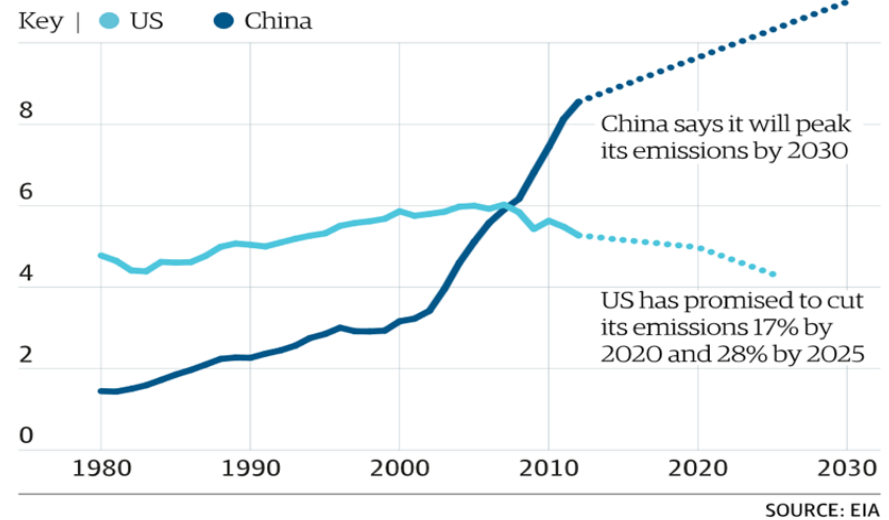


# China and the U.S. Have a Commitment to Reduce CO2 Emissions

- China has firm commitment to not increase their CO2 emissions beyond 2030
- The United States has pledged to cut its emissions to 26-28% below 2005 levels by 2025



**CO2 emissions, billion tonnes**

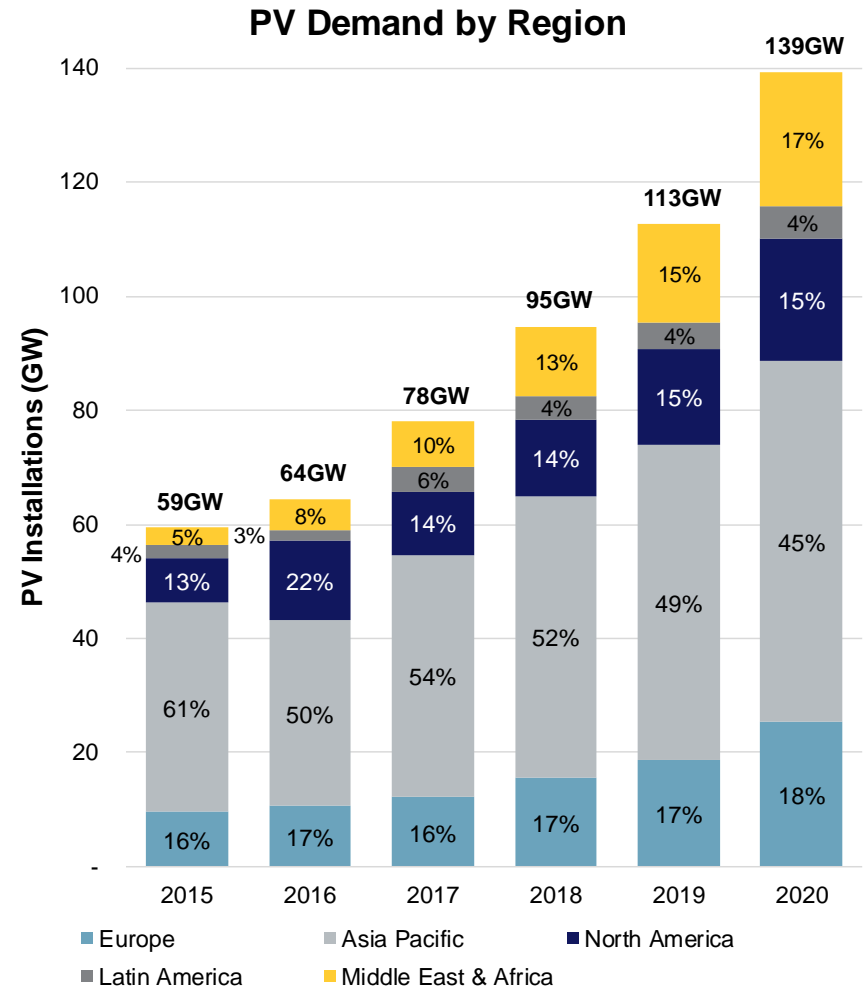


Source: <http://www.theguardian.com/environment/2014/nov/12/china-and-us-make-carbon-pledge>

# Expected PV Demand Growth: 19% CAGR

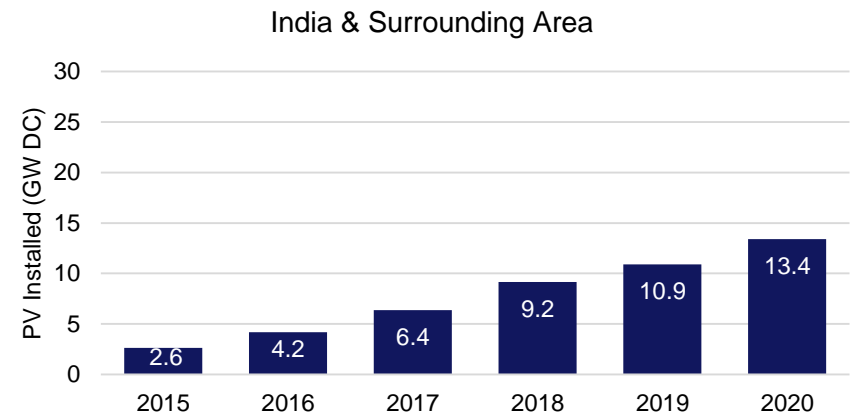
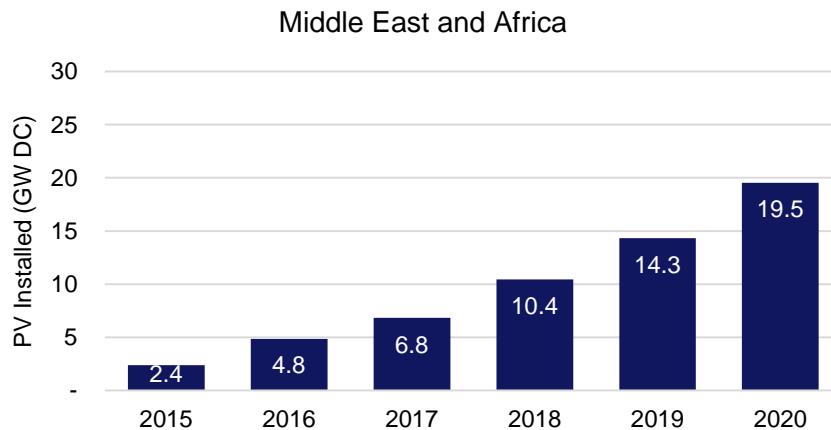
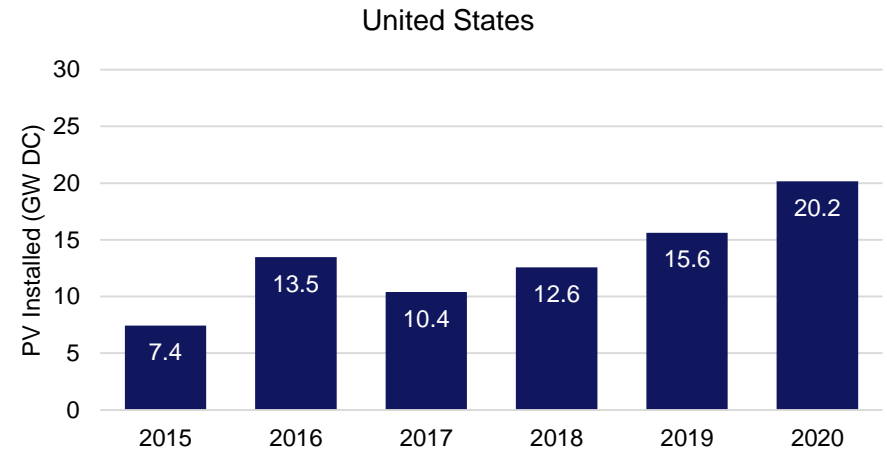
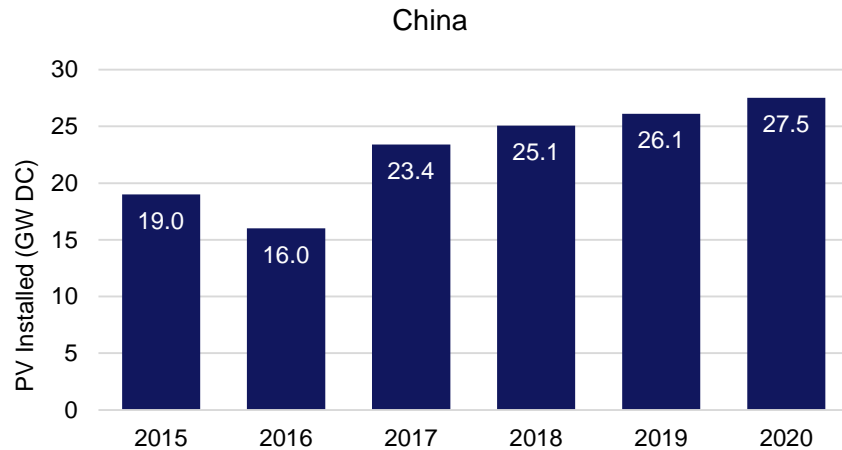
## › Main driving forces:

- United Nations Conference on Climate Change (COP21: Paris)
- Largest market for PV: China
- Extension of ITC Credit in the US
- Higher Growth Expectations for Emerging Markets



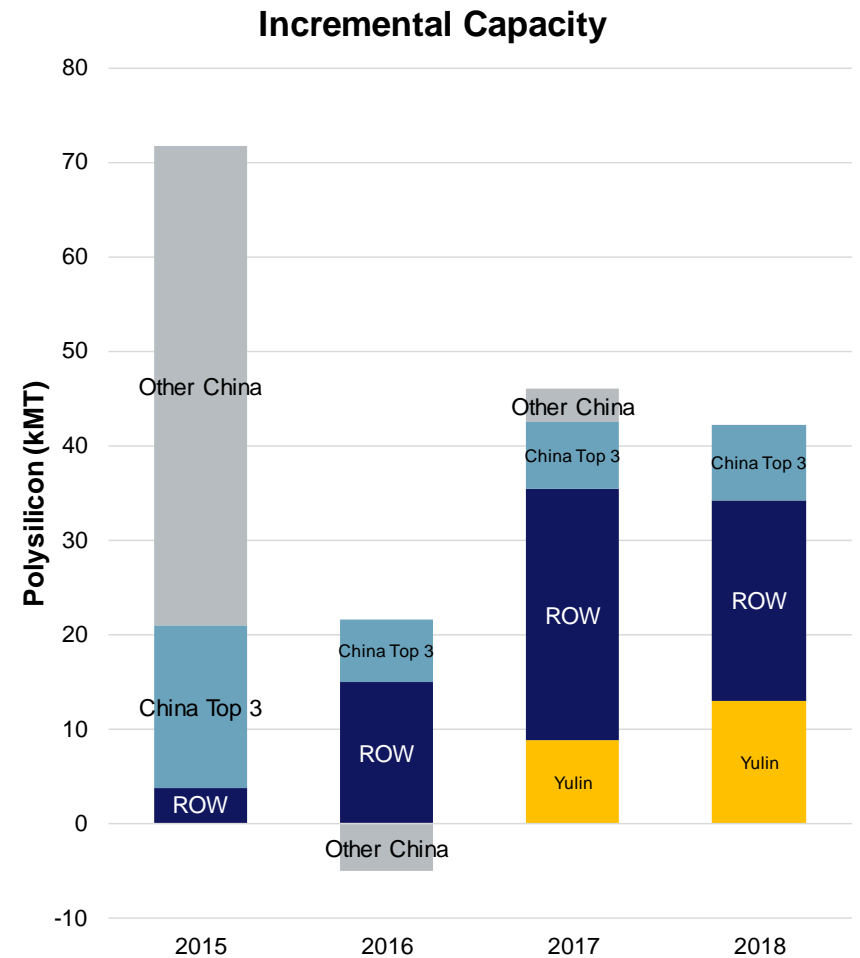
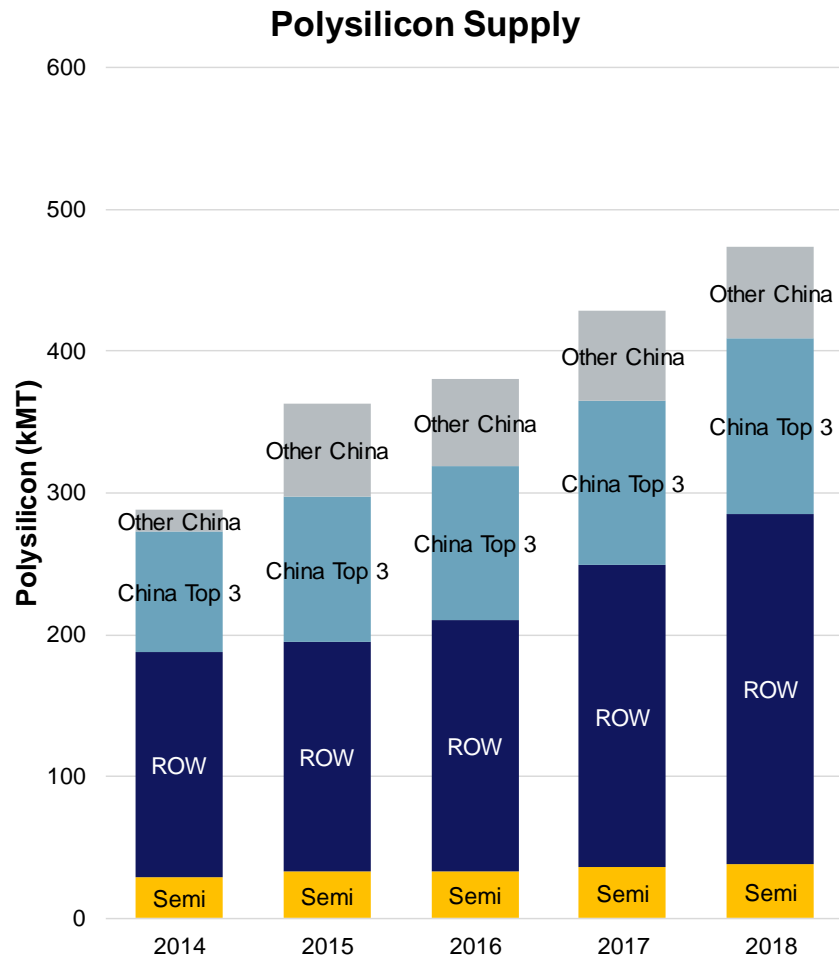
Source : GTM Research Solar Executive Briefing Q4 2015 Provisional

# Regional Solar Installation Forecasts Continue to Increase



Source: GTM Research Solar Executive Briefing Q4 2015 Provisional

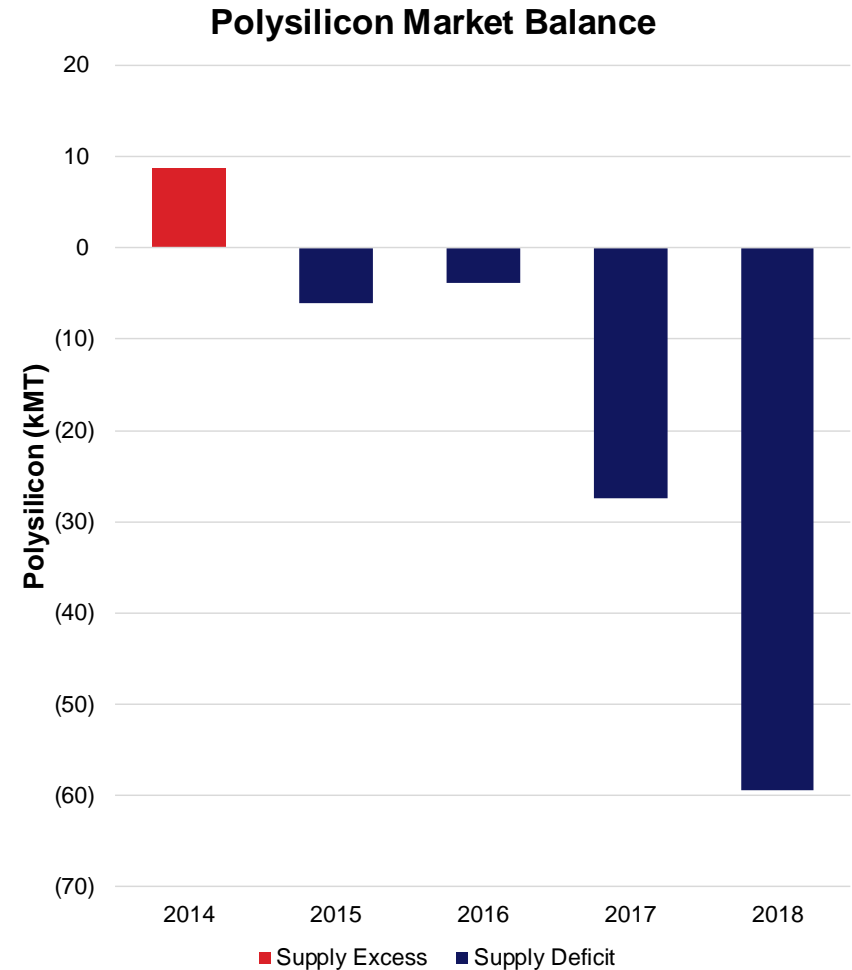
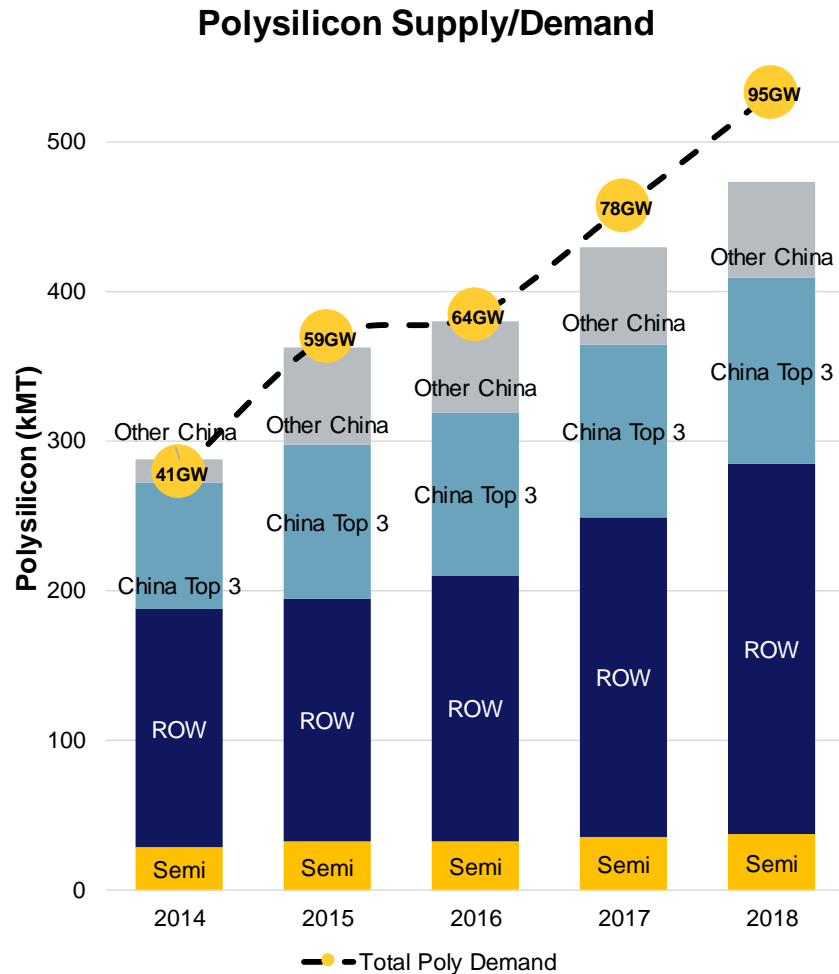
# Polysilicon Industry Supply Forecast



Source: Competitor releases, industry analysts, REC Market Intelligence



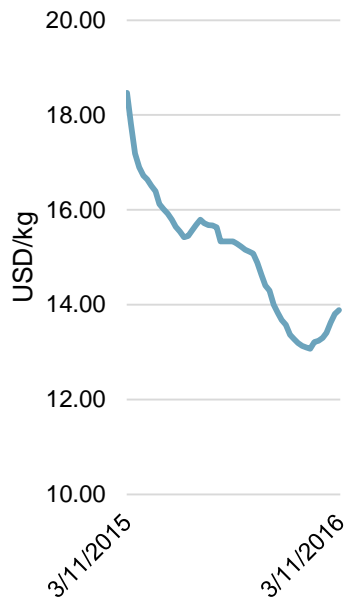
# Polysilicon Will Become Limiting Factor for PV Market Growth



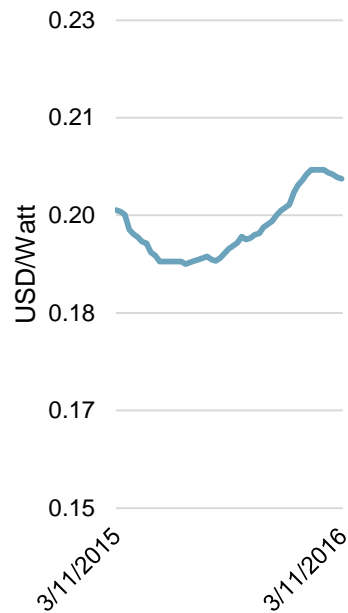
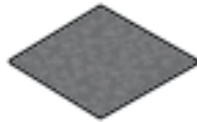
Source: Demand Data Installations: GTM Research, PV Pulse, January 2016  
Supply Data: Competitor releases, industry analysts, REC Market Intelligence

# Recent Price Increases

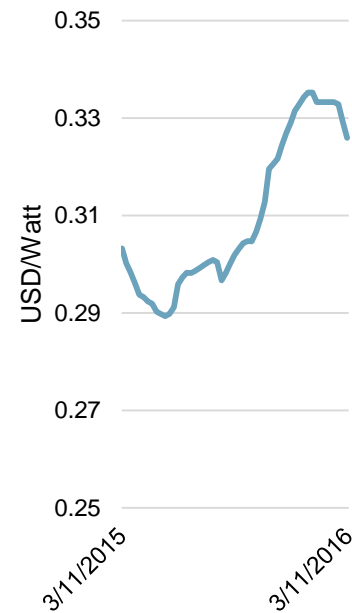
## Polysilicon



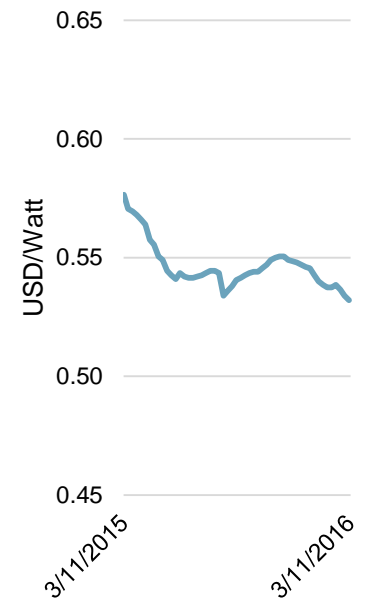
## Wafer




## Cells



## Modules






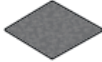

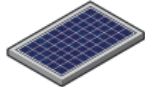


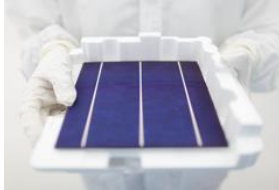


Source: GTM Research, PV Pulse February 2016



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# REC Silicon's Position in the PV Value Chain

Metallurgical silicon	Polysilicon	Ingots growth / wafers	Cells	Modules	Systems
	 				
	<p>Chemical process</p> <p><b>RECSiLICON</b></p>				
		Casting and cutting	Surface treatment	Assembly	Installation, additional components

# Moses Lake: Serving PV Market with High Quality Low Cost FBR

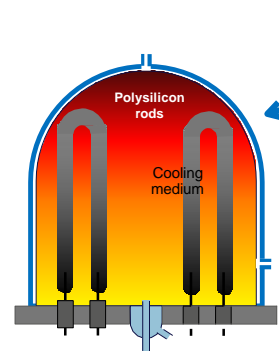
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- › FBR - Solar grade
- › Silicon III, IV
- › Silane Gas: 22,000 MT
- › Granular Silicon: 16,300 MT
- › World's largest manufacturer of Granular polysilicon
- › Technology and cost leader through proprietary FBR technology



# REC Silicon's Proprietary FBR: Low Energy Consumption & Continuous Production Process

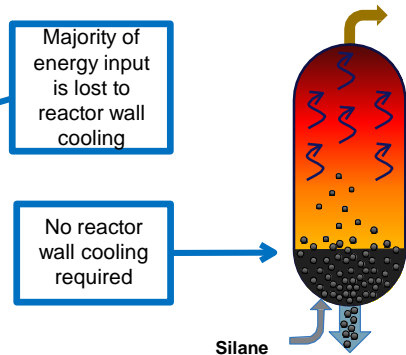
Siemens Reactor  
TCS Based



## Siemens Technology:

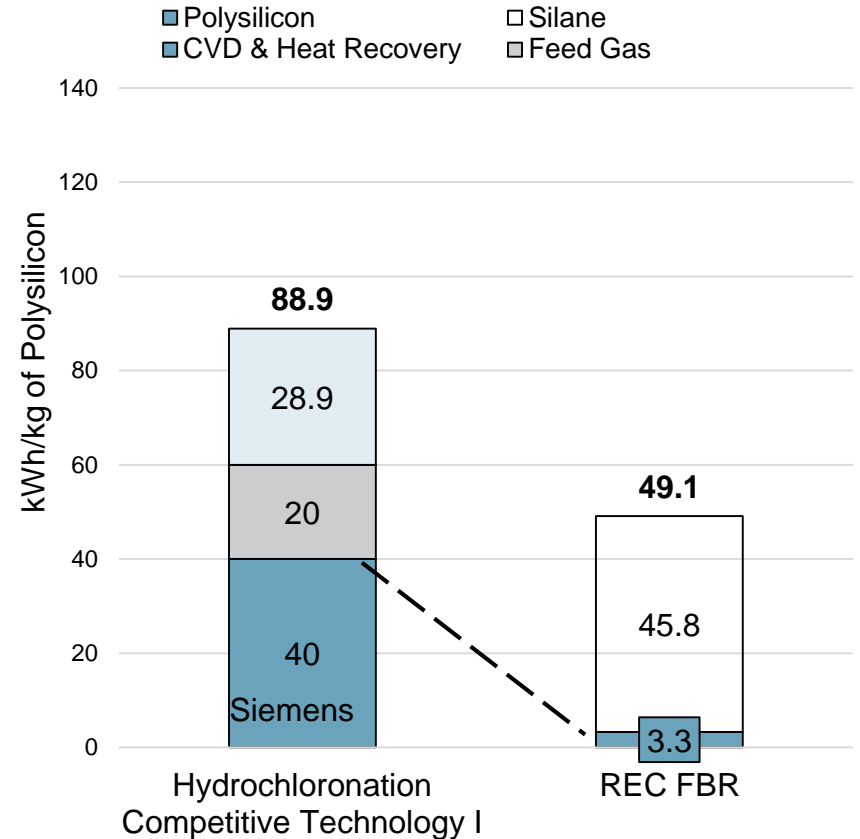
- 40 year old technology
- Batch process
- Requires post processing
- High cash cost

FBR Reactor  
Silane Based



## FBR Technology:

- Proprietary REC technology
- Most energy efficient
- Continuous production
- Lowest cash cost



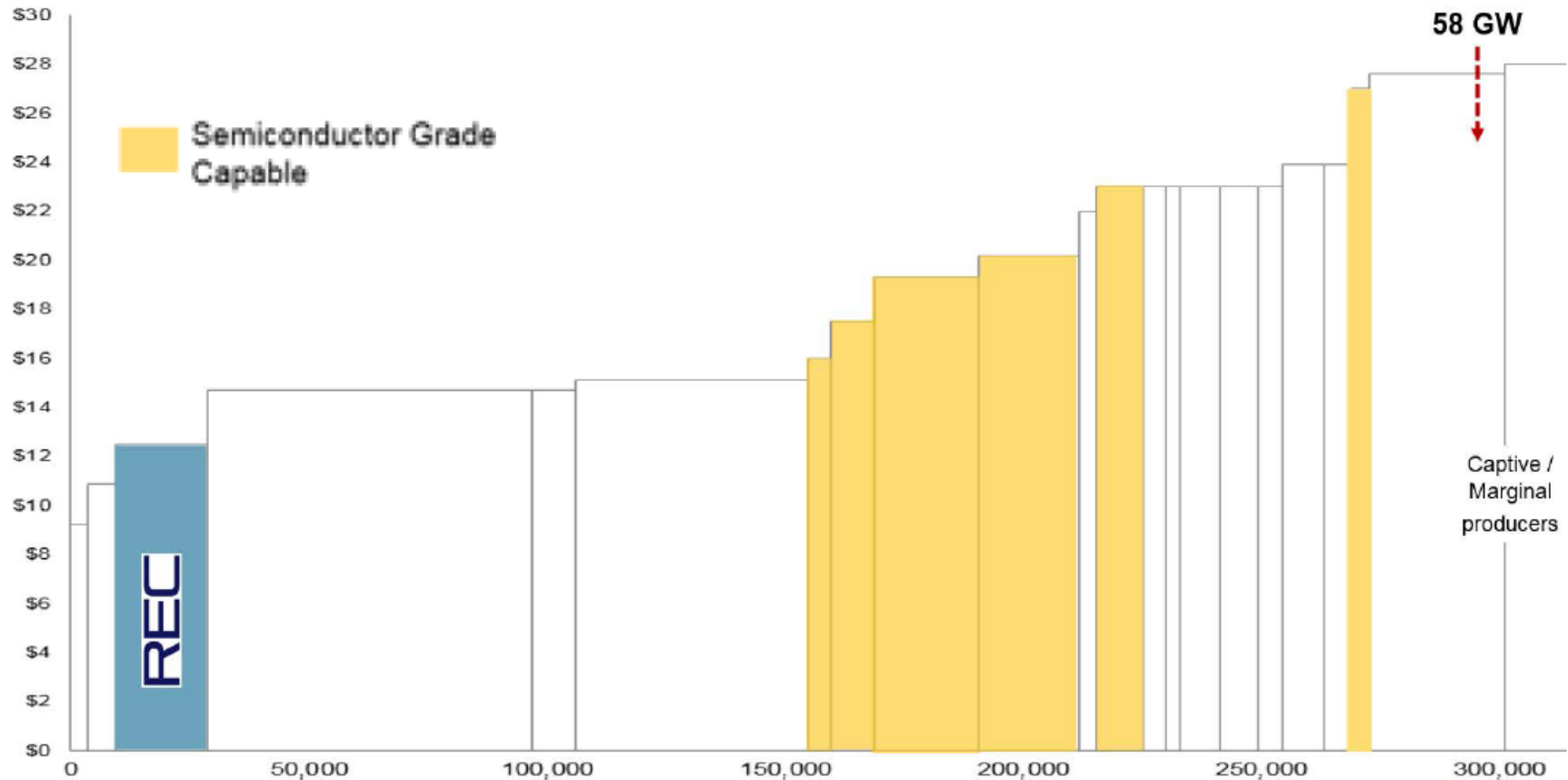
Note 1 REC silicon data based on 2014 measured energy consumption and actual production. This includes consumption for operations, maintenance, and analytical functions.

Note 2 REC data includes the buildings (lights/HVAC) along with processing, packaging, treatment, and support equipment.

Note 3 Competitive technology data appears to be based on simulations of power consumption for only the process equipment to manufacture Polysilicon when it is operating at 100% utilization)



# Leading Cost Position Through Proprietary FBR Technology



Source: Competitor releases, industry analysts, REC Market Intelligence



U.S. / China Trade  
War

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# U.S. / China Trade War

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## › Already In 2016, U.S. and China Have Restarted Discussions and Reiterated Commitment for a Resolution at the Highest Levels

- MOFCOM Sent a Delegation to the U.S. For a Week in January to Discuss Resolution Structures
- U.S. Trade Ambassador Froman and China's Minister Gao Met in Beijing on February 2, 2016
- China Requires a “Balanced and Reciprocal” Deal
- U.S. Needs Reasonable Market Access For its Polysilicon Producers



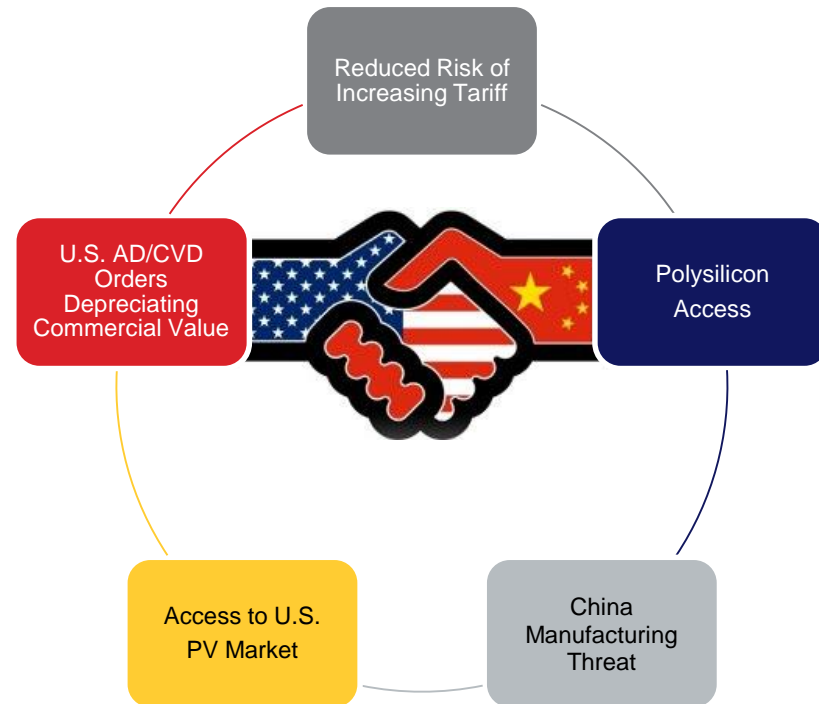
# Why a Resolution Makes Sense for Both U.S. & China

## > China

- Improved access to U.S. panel market
- Eliminate risk of retrospective U.S. duty hikes
- Polysilicon shortage looming in China
- Incentivizing movement of solar manufacturing outside of China threatens solar dominance


## > U.S.

- U.S. AD/CVD orders depreciating commercial value
- Re-opening China market for the high tech U.S. Polysilicon industry creates more value on balance for U.S. interests




# Additional Pressure For a Resolution

- › Hemlock Breach of Contract Litigation Against SolarWorld Subsidiary
  - \$676 Million Case, Pending in US District Court in Michigan
  - SolarWorld Lost Key Motion in October 2015, Resulting in Significant Drop in Share Price
  - Trial Date in May 2016
- › Hemlock: US Polysilicon Producer
  - Owned by Dow Corning and Shin Etsu
  - Polysilicon Capacity (Michigan Plant): Estimated at 32,000 MT



Hemlock litigation characterized as high risk in medium to long term: *"If courts should decide that the silicon supplier is entitled to damages from our subsidiary SolarWorld Industries Sachsen GmbH, this would have a **considerable negative impact on the company's liquidity position, possibly even threatening the company's continued existence.**"* – SolarWorld Group 2014 Annual Report (released March 2015)







Path Forward

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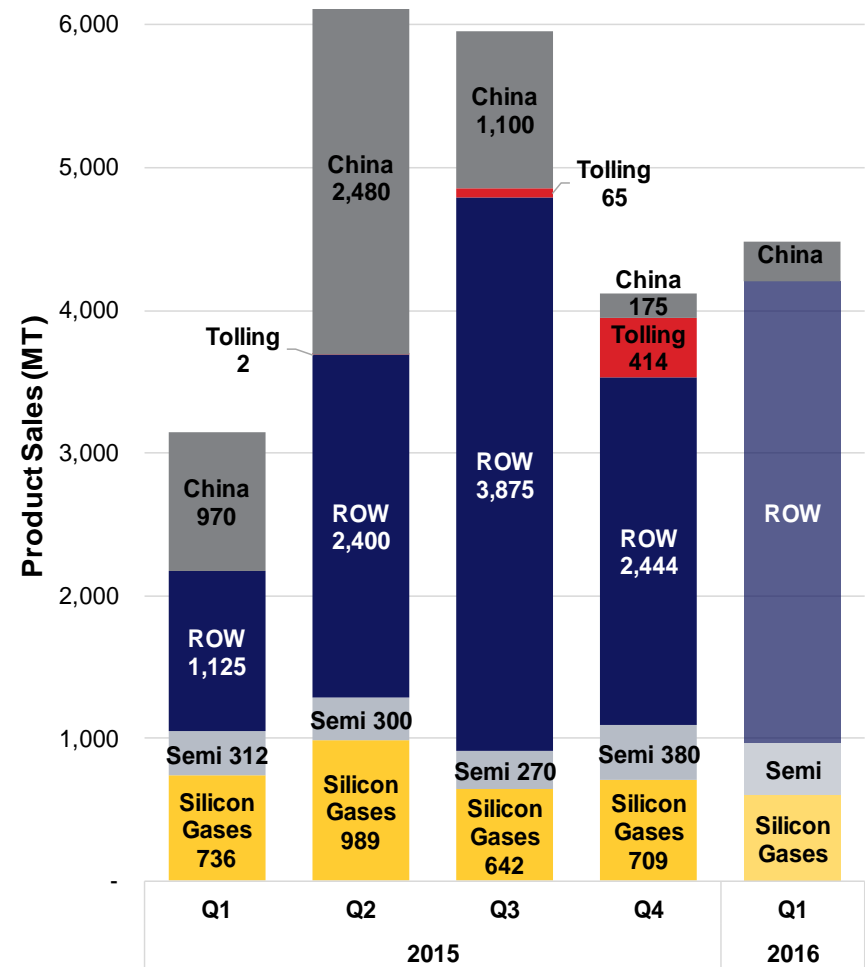
# Decrease Reliance on Chinese Markets

## Market Outside China

- › Continue qualification and optimization plan
- › Continue to discount aggressively if required to maximize volumes

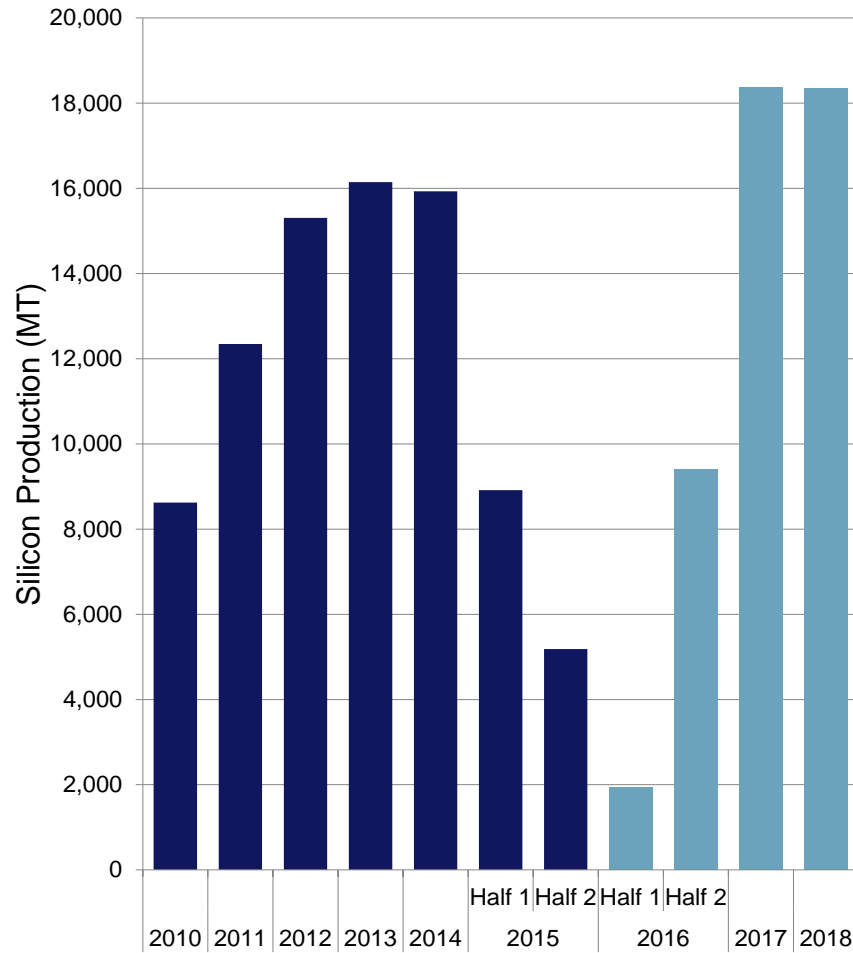
## Target Sales to Reduce Inventory and Generate Cash

- › Sales supported by on hand inventories until restart

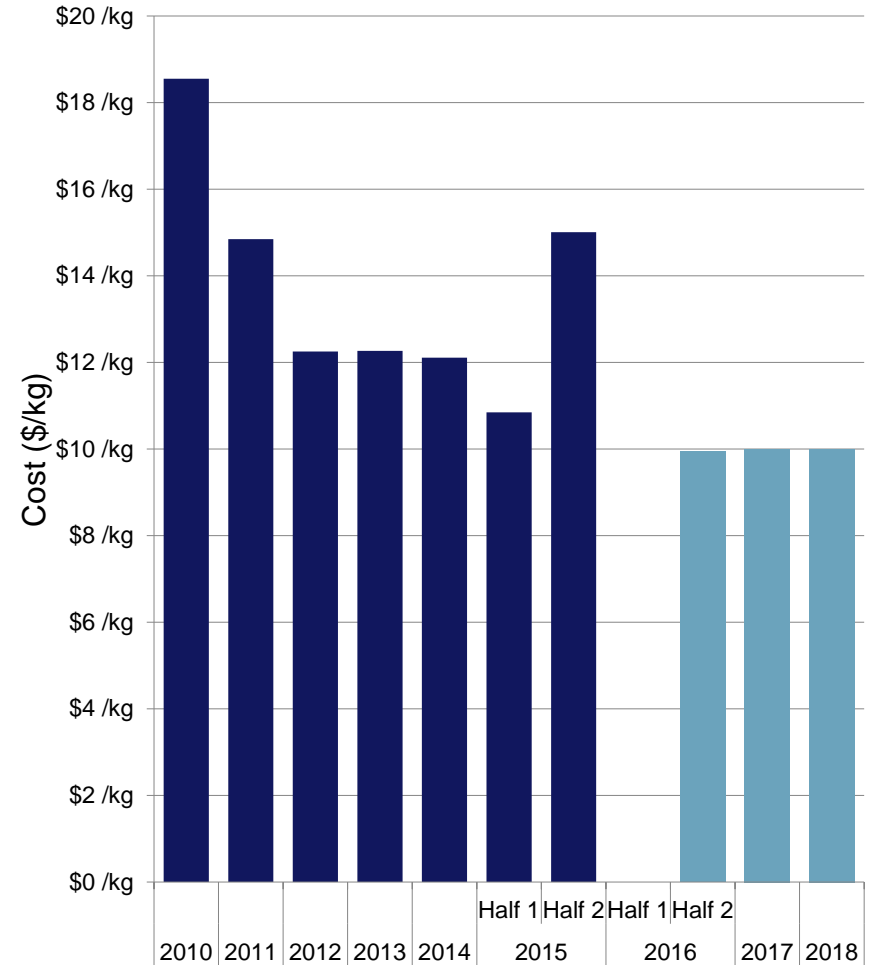


# Full Capacity Utilization Cash Cost at ~USD 10/Kg Going Forward

## FBR Production



## FBR Cash Cost



# Debt Coverage at December 31, 2015

## Nominal Net Debt - \$109 M

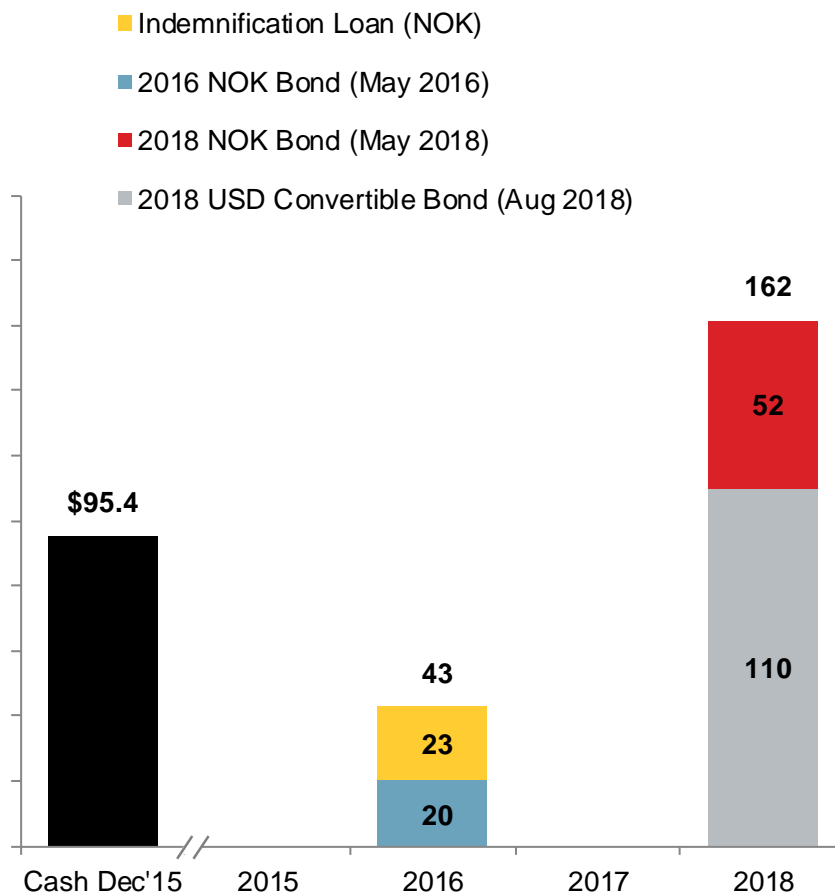
- › Decreased by \$4.2 M during Q4 2015
  - › Increase in cash of \$0.7 M
  - › Decrease in nominal debt of \$3.4 M

## Nominal Debt - \$205 M

- › Decreased by \$3.4 M in Q4 2015 due to stronger US Dollar

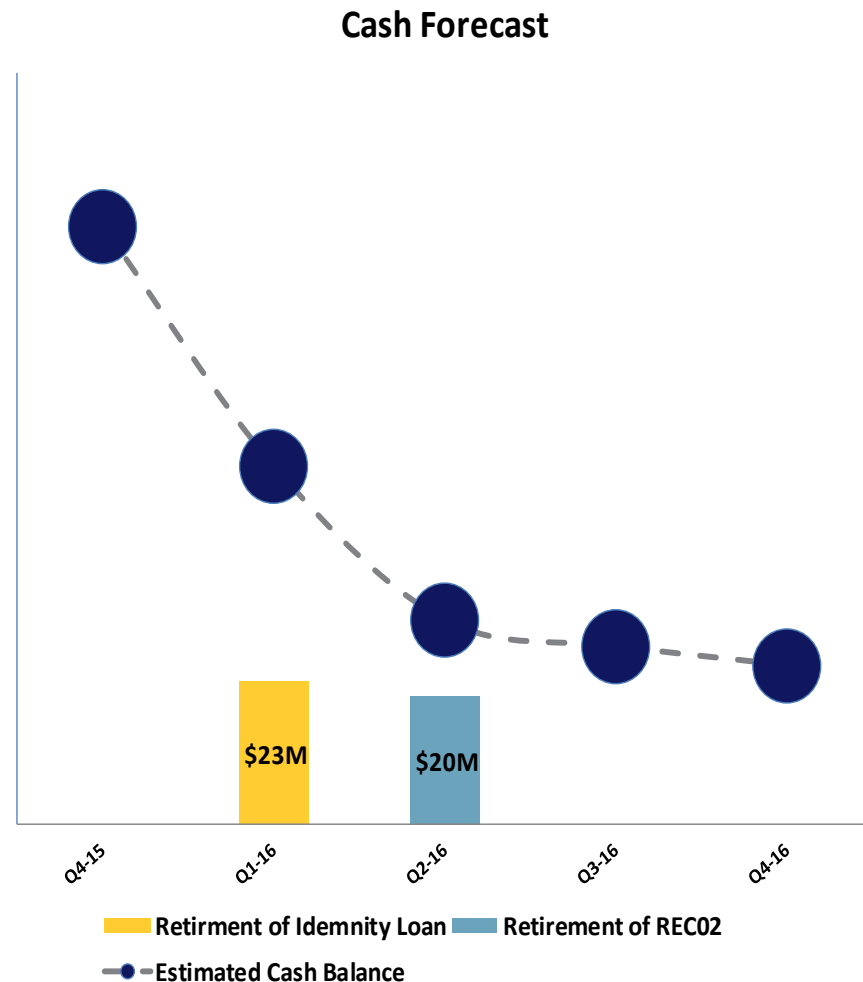
No further debt obligations until May 2018

USD million



# 2016 Debt Obligations Met With Current Cash Forecast

- › Moderate Solar Grade Price Increases in 2016
- › Silane III and IV Startup Expected in June 2016
  - Restart Dependent on:
    - Trade War Status
    - Market Conditions
- › Maintain Liquidity
  - Silane III and IV Capacity Curtailment
  - Reduce Polysilicon Inventory Levels
  - Limit Capital Expenditures



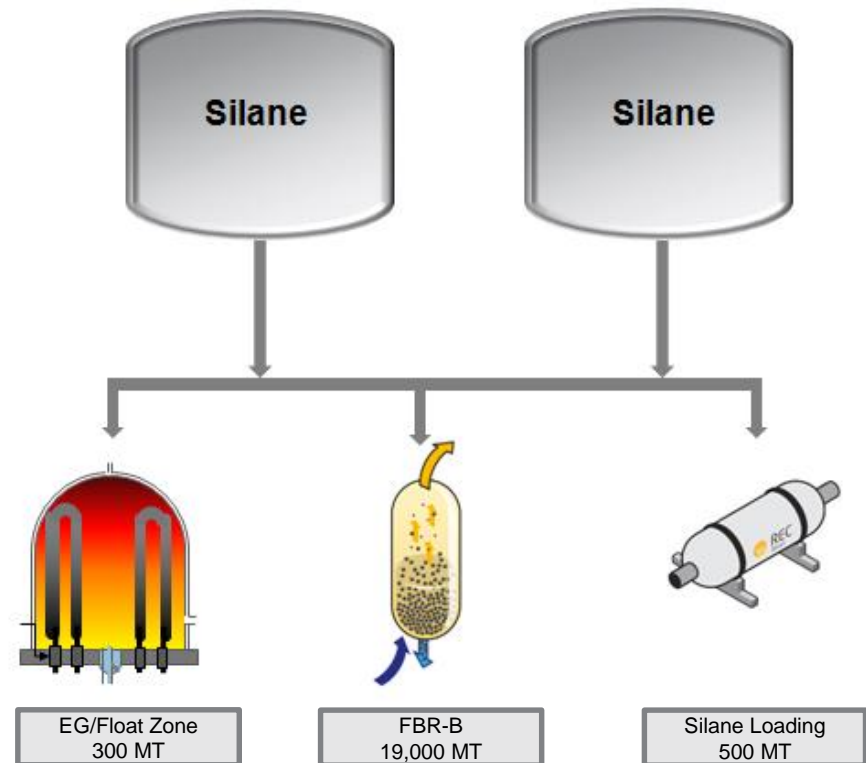


# Yulin JV Update



## Position in China Through Yulin JV – Development on Track

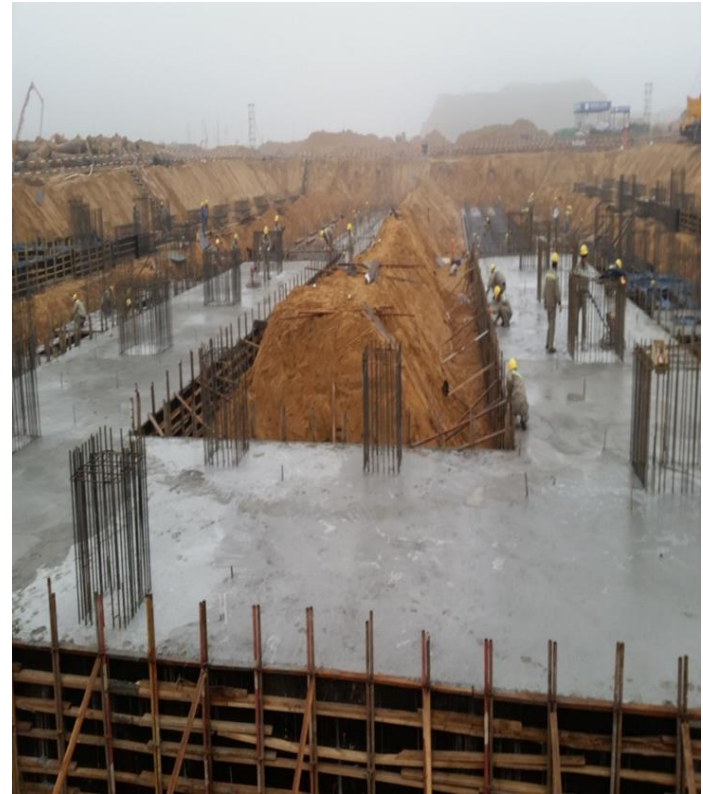
- › Total Investment: \$1.25 B
- › Investment Parameters:
  - CAPEX: \$60/kg
  - Cash Cost: ~\$9/kg
  - Production Development
    - 2017 ~7,300 MT
    - 2018 ~ 16,300 MT
    - 2019 ~ 19,300 MT
- › Start-up expected mid-2017






# Yulin JV – On Track

- › Equipment tendering in progress, 70% issued or awarded
- › Critical path equipment under fabrication (Hydrogenation and FBR reactors and compressors)
- › Critical excavation and foundation work for 2015 completed
- › 2016 and 2017 Capital Contributions Might Be Deferred If Financial Situation Requires



Completed FBR Building Foundation

The background of the slide features a close-up, high-contrast photograph of several broken silicon wafers. The wafers are dark, reflective, and show concentric circular patterns, indicating they are semiconductor components. They are scattered across a dark, granular surface, possibly a wafer carrier or a processing tray. The lighting creates bright highlights on the edges and surfaces of the broken pieces, emphasizing their metallic texture and the sharp edges of the fractures.

Conclusion

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# The Investment Case



**Strong growth in PV-demand (19% CAGR)**  
**Polysilicon market balance YE 2016**

**Available capacity to meet increased demand**  
**Long lead times limit industry expansion**

**Strong positions in core markets**  
**Presence in China through joint venture**

**Industry leading low cost position**  
**Proprietary Silane based FBR technology**

**Financial strength to bridge market downturn**  
**Cash on-hand to meet debt maturities**



# Focus Areas for REC Silicon 2016

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- › Strong momentum to resolve trade dispute
- › Temporary shut-down of Moses Lake will reduce inventory levels
- › Acquire customers for offtake of full capacity by offering competitive pricing
- › Focus on reduced spending
- › Prepare for successful Yulin JV Plant
- › Return to full capacity June 2016 with industry leading cash costs



A photograph of a large industrial facility, likely a refinery or chemical plant, at night. The scene is illuminated by numerous warm yellow lights, creating a strong contrast with the dark blue twilight sky. The facility features a complex network of tall distillation columns, intricate piping systems, and multiple levels of steel scaffolding. In the foreground, there are some lower-level buildings and more piping. The overall atmosphere is one of industrial activity and scale.

Thank You  
Tusen Takk

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