



# REC'S SOLAR MARKET INSIGHT

Q4 2016 / Full-year 2016



**REC**

ENERGIZING LIFE TOGETHER

- REC celebrated its **20<sup>th</sup> anniversary** – having grown from a pioneer in solar to world leader
- **New record efficiency of 20.46%** achieved for multicrystalline solar cell manufactured at REC – above 20% to be in mass production in 2017
- In Q3 2016, REC **officially opened of Herøya ingot plant** with Norway's Prime Minister Erna Solberg cutting the ribbon
- REC accelerated the **conversion from REC Peak Energy to REC TwinPeak** and will be introducing a **mono product in 2017**
- Successful launch of **REC's new 72-cell** version of the award-winning REC TwinPeak Series, **rated up to 340 Wp**
- REC ranked as the **#1 most popular brand of modules for homes in California** and **#2 most popular brand of modules for homes throughout entire U.S.**<sup>1</sup>
- In **US, Q3 2016** completion of **257 MW utility project in California** on 1,900 acres of retired agricultural land
- **REC has doubled its market share in Germany in 2016** compared to 2015, reaching approximately **13%**
- **In Q4 2016**, REC achieved **one of the strongest quarters in sales volume** in its history

- 1 Global Performance – Q4 2016 / FY 2016
- 2 REC Highlights – Q4 2016
- 3 Regional Performance – Q4 2016
- 4 Product and Technology Highlights

# Major REC Q4 2016 Highlights



- **Q4 2016** was **one of the strongest quarters** for sales volume in REC history
  - **Best quarter** ever for REC in **EMEA**
  - **2nd-best quarter** ever for REC in **APAC<sup>1</sup>**
  - **2nd-best quarter** ever for **REC worldwide**
- REC maintains leading rankings:
  - **#1 most popular brand** of solar panels for homes in **California**
  - **#2 most popular brand** of solar panels for homes in **entire U.S.**
- Strong Q4 2016 helps REC achieve **approximately 13% market share in Germany in 2016** (~200 MW shipments in FY 2016)
- Elkem Solar receives **funding from Enova** for investments to increase the usage of recyclable materials
- **Floating PV** test site launch in Singapore



<sup>1</sup> APAC only (i.e. excluding Japan)



# REC appointed Mr. Ken Fong as new Regional President for REC Americas

- Mr. Fong will be responsible for REC's business operations in the Americas, which includes the U.S., Canada, and Latin America
- Over 25 years of professional experience in sales, marketing, and business development to REC, including 10 years of solar industry experience
- Prior to REC, held senior roles at SunEdison, SunPower, and SolFocus as well as leading brands from other industries
- Graduated Summa Cum Laude with a B.Sc. degree in Mechanical Engineering from California Polytechnic University and holds an MBA from the Anderson School of Management at UCLA





2.2 MW, Singapore

- 1
- 2
- 3
- 4

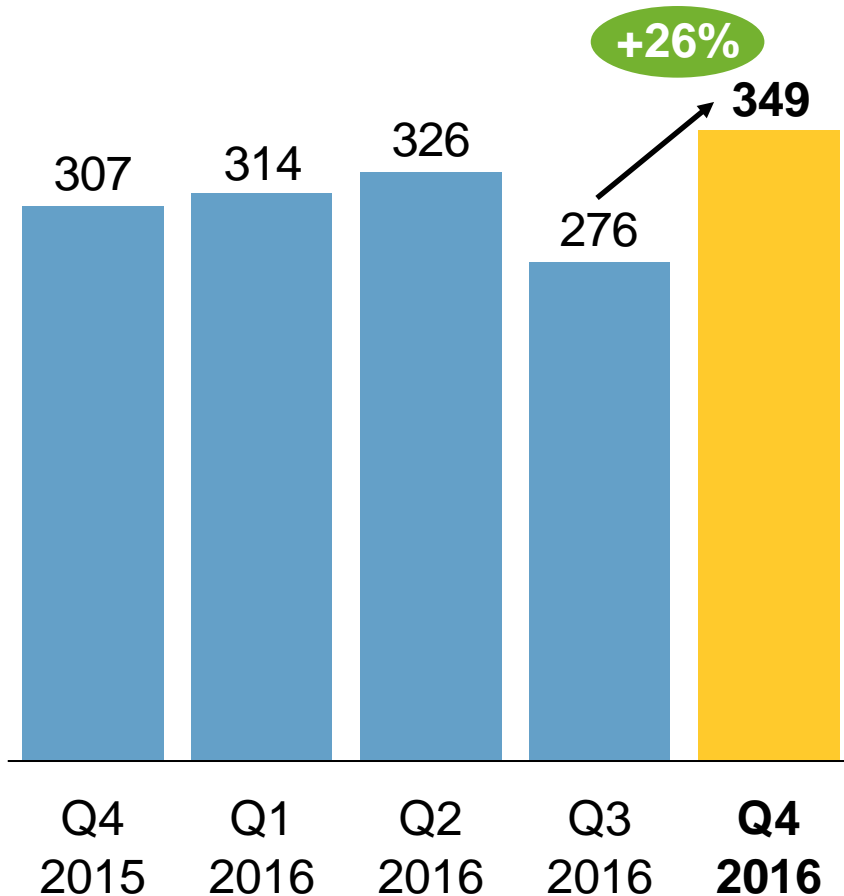
# Global Performance – Q4 2016 / FY 2016



# Q4 2016 was one of the strongest quarters for sales volume in REC history



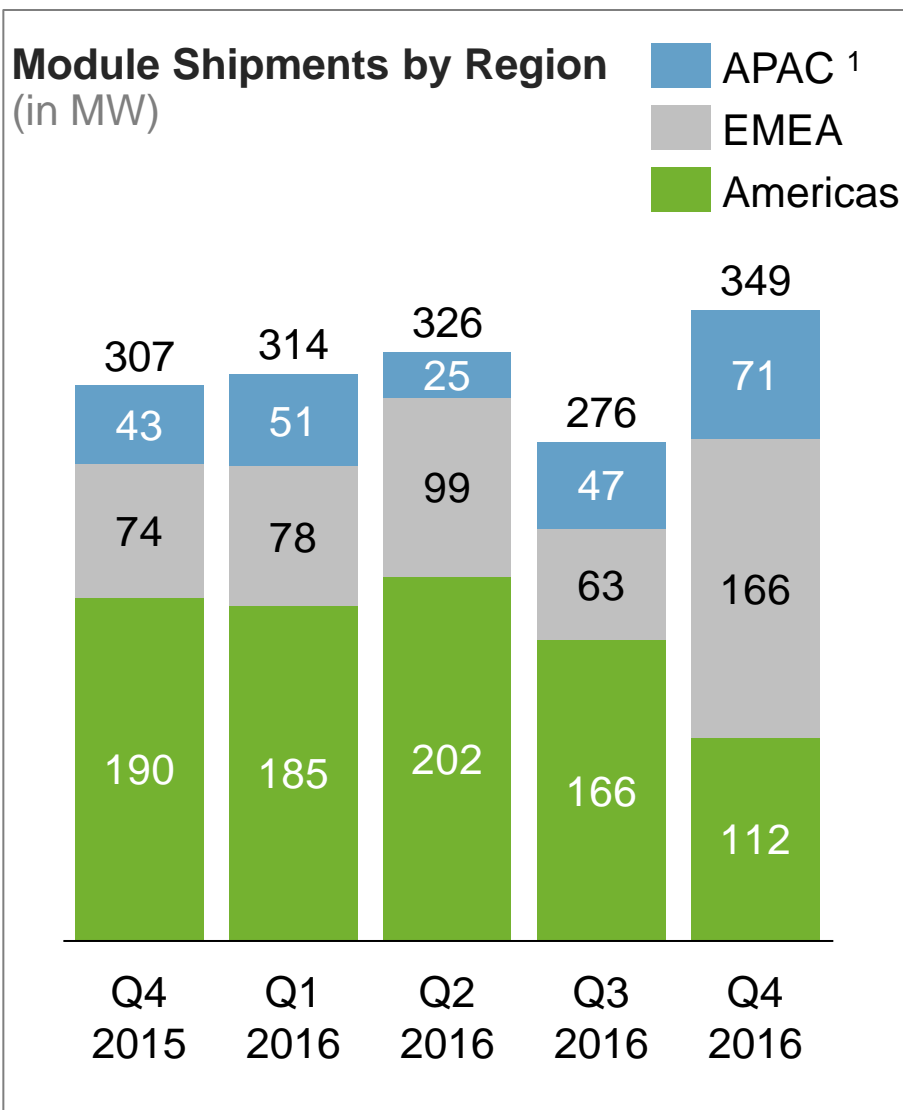
**Module Shipments by Quarter**  
(in MW)



- Q4 2016 module shipments **totaled 349 MW**
  - 2nd-highest volume ever for REC in a single quarter
- Quarterly module **shipments increased by 26%** compared to Q3 2016
- **14% year-over-year increase** in total module shipments



# EMEA had its best quarter ever, with strong sales in U.S. and APAC



- EMEA accounted for the **majority of REC shipments** in Q4 2016 with 48%
  - **Best quarter ever** for REC in EMEA
  - **Increase** in shipments **quarter-over-quarter by 163%**
- The **APAC region** performed strong as well, with an **increase in shipments quarter-over-quarter by 51%**
  - **2nd-best quarter ever** for REC in APAC<sup>2</sup>
- Shipments to the Americas declined by 33% compared to previous quarter

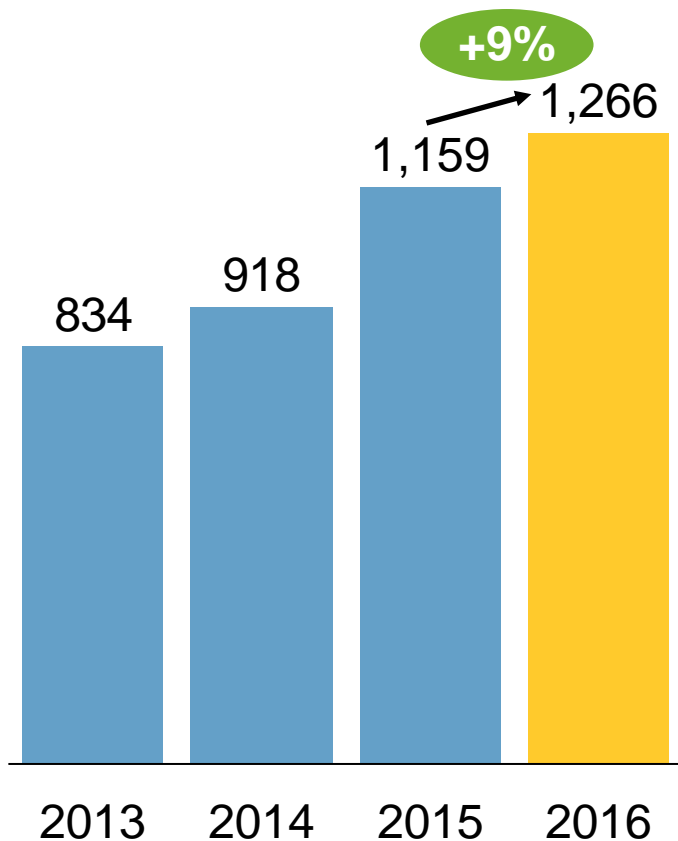
<sup>1</sup> Including Japan; Excluding China

<sup>2</sup> APAC only (i.e. excluding Japan)



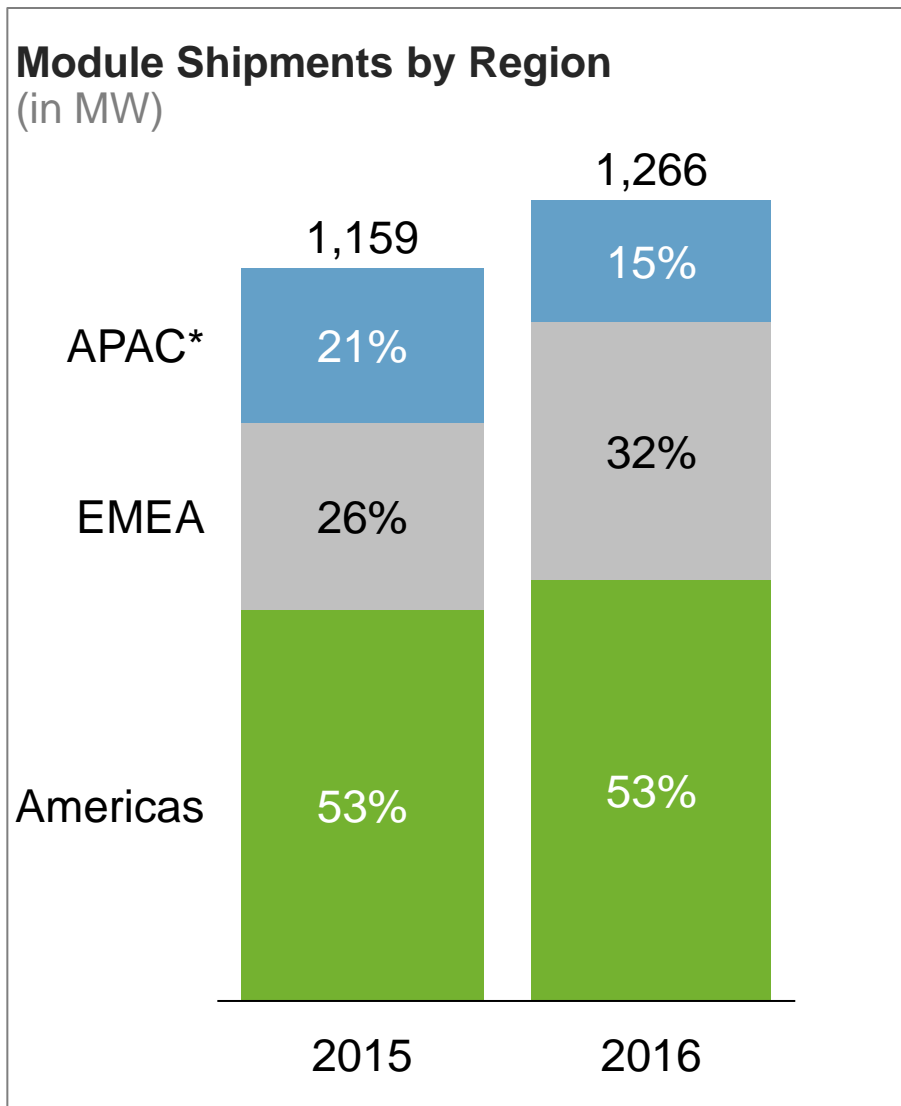
# Shipments steadily increase to meet the growing global demand for REC products

**Module Shipments by Year**  
(in MW)



- Continuous **growth year-over-year** in module shipments
- **9% increase in module shipments vs. 2015**
- Full year availability of REC's award-winning TwinPeak Series with increased volume
- Launch of **new 72-cell** version of the TwinPeak Series, **rated up to 340 Wp**
- **R&D focus and technology leadership** (multicrystalline solar cells with efficiencies above 20%)
- Continuous focus on **quality and customer satisfaction**

# Americas accounted for 53% of REC's total shipments in 2016 with strong EMEA and APAC sales in 2H'16



- The **Americas** accounted for over **50%** of REC shipments in 2016
  - **Strong representation in residential market** with REC's award-winning products for this segment
- **EMEA** increased its sales proportion with a **strong performance in REC's traditional core markets**
  - In **Germany**, REC has **doubled its market share in 2016** compared to 2015, reaching approximately **13%**
  - Plus, strong demand for REC's products across all market segments
- **APAC sales were driven by India, Australia and Japan**

\* Including Japan; Excluding China



15.53 MW, Kaua'i, USA

1

2

3

4

## REC Highlights – Q4 2016



- Elkem Solar has received a funding of 25.6 million NOK from Enova, a Norwegian public enterprise aimed to promote energy efficiency measures
- The funding will be used for restructuring and investments in the production process (i.e. increase the usage of recyclable materials)
- The produced blocks/wafers are based on **Elkem Solar Silicon® (ESS®)** – a **high-purity silicon**
- **Production of ESS®** requires only 25% of the energy consumption and CO<sub>2</sub> emission of polysilicon by the Siemens process – leading to **one of the lowest carbon footprints in the industry**





# Floating PV test site launch in Singapore



- REC is pleased to be participating in a floating PV test site in Singapore
- The test site, officially opened in October 2016, is operated by SERIS (the Solar Energy Research Center of Singapore)
- Key objective of the site is to document the effectiveness of different floating PV solutions and to measure the effect of floating PV structures on the evaporation from the reservoir
- REC uses the opportunity of the site for testing the benefits of bifacial modules on a floating structure
- For its two arrays on the test site, REC is partnering with 1) French company Ciel & Terre and 2) Japanese company Takiron Engineering





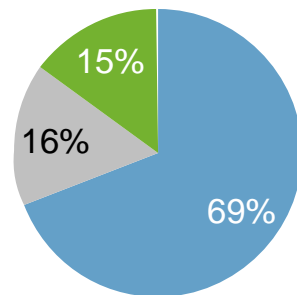
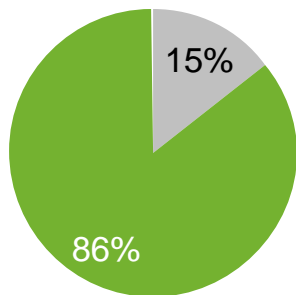
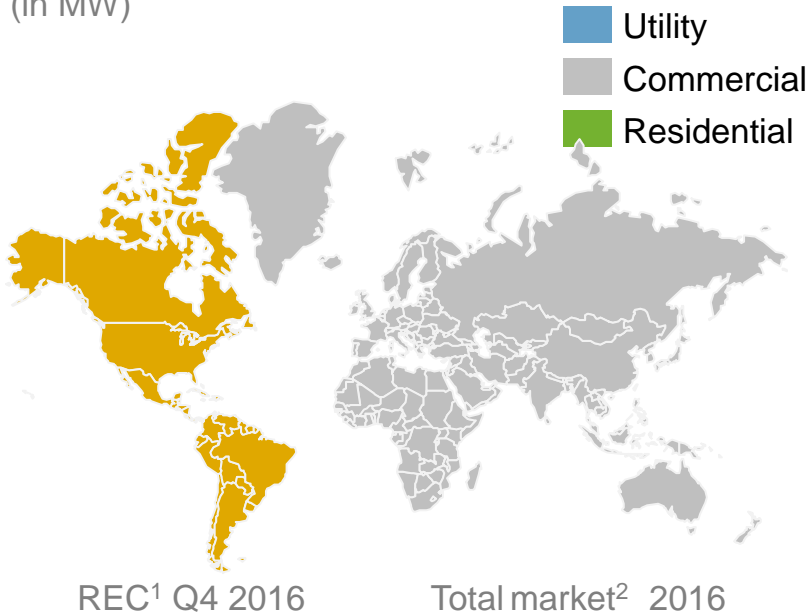
24 MW, Canino, Italy

- 1
- 2
- 3
- 4

# Regional Performance Q4 2016



## Q4 2016 Module Shipments split by Segment (in MW)



## REC Performance Highlights

- REC ranked as<sup>3</sup>:
  - **#1 most popular brand** of modules for homes in **California** (7<sup>th</sup> consecutive quarter) and in Colorado
  - **#2 most popular brand** of modules for homes throughout entire **U.S.**

## U.S. Market Development Highlights

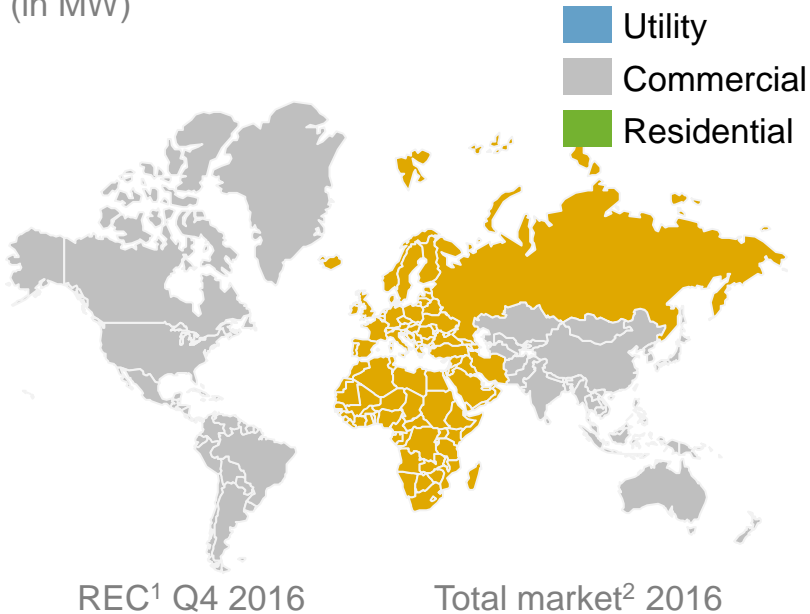
- US solar market set a new record by nearly doubling its 2015 annual installations to reach ~14.6 GW in 2016
- Commercial PV segment grows in light of rising community solar
- Solar City, the largest residential solar PV installer in the U.S., was acquired by Tesla in an all-stock deal
- U.S. module ASPs continued to decline; relatively equivalent to the global ASP by end of Q4 2016

<sup>1</sup> REC market segment module shipment volume splits are best estimates; <sup>2</sup> Total market estimate; <sup>3</sup> Based on Q1-Q3 2016, published December 2016

Source: REC; GTM Research December 2016 ; IHS Markit



## Q4 2016 Module Shipments split by Segment (in MW)



## REC Performance Highlights

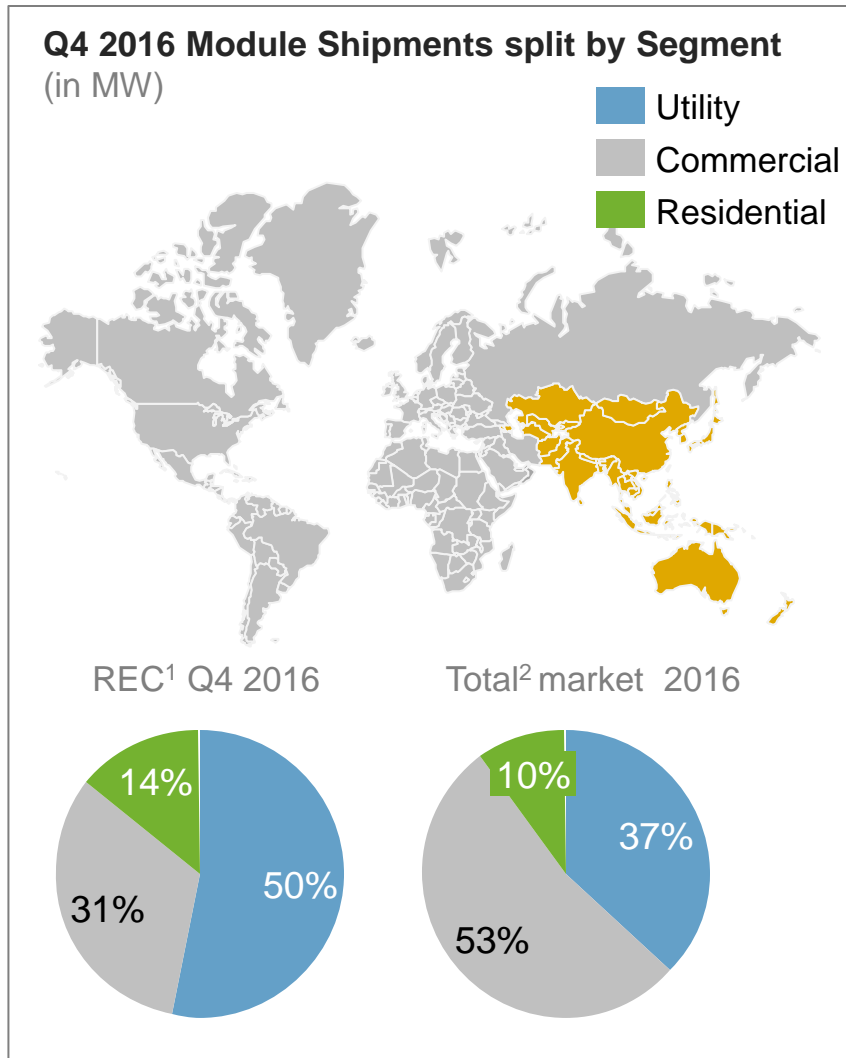
- **Best quarter ever** for REC in EMEA
- Key markets in Q4 as well as in FY 2016 were **Germany, UK and the Netherlands**, driven by factors such as auctions and expired ROC scheme
- Successful leveraging of partnerships with **leading project developers in several countries**
- Strong **REC brand recognition** supports the residential and C&I segments

## EMEA Region Development Highlights

- European Commission presented its "Clean Energy for All Europeans" package – i.e. supporting the rise of prosumers and self-consumption
- Ongoing spread of auction model for renewables (e.g. Poland)
- European Commission has proposed the extension of the trade measures on solar modules and cells imported into the E.U. from Asia for 18 months
- France struggles with slow PV installation rates despite ambitious PV target

1 REC market segment module shipment volume splits are best estimates; 2 Total market estimate





## REC Performance Highlights

- **2nd best quarter ever** for REC in APAC<sup>3</sup>
- Very **strong** sales in **India** and **Australia**
- REC sees **further demand growth** for quality products in other markets going forward (e.g. Thailand)
- In **Japan**, REC enjoys **rising distribution sales in C&I** segment and **growing demand** from the **utility** segment

## APAC Region Development Highlights

- Positive demand sentiment across the region (e.g. India and Australia)
- Newly introduced FiT system in Taiwan leading to high market activity
- Delayed implementation of the proposed FiT system in Indonesia and the Philippines is slowing down the expected development in these markets despite the large potential
- In Japan, module replacement projects are activating the module supply business, but the market still suffers from continuous slow grid-connection due to the overcapacity

<sup>1</sup> REC market segment module shipment volume splits are best estimates; <sup>2</sup> Total market estimate (ex. China); <sup>3</sup> referring to only APAC shipments (i.e. excluding Japan)

Source: REC; IHS Markit, Bloomberg



573 kW, Dubai, UAE

- 1
- 2
- 3
- 4

# Product and Technology Highlights





# REC TwinPeak 2 Series launch – new generation of award-winning solar panel rated up to 295 Wp



- REC launched its new REC TwinPeak 2 Series solar panel beginning of 2017
- **REC TwinPeak 2 is rated up to 295 Wp**, taking the **power output** of 60-cell multicrystalline panels to **new heights**
- The product uses evolving REC TwinPeak technologies
  - **Cells from larger wafers (156.75 mm) – first for REC products**
  - **Five busbars – first for REC products**
  - Half-cut cell technology
  - PERC (Passivated Emitter Rear Cell) technology
  - Split junction box allowing innovative panel design
- REC TwinPeak 2 **offers almost immediate benefits** to installers, EPCs, investors, and end customers via lower balance of system costs and higher system yield





I'd put my money on the sun and solar energy. What a source of power! I hope we don't have to wait till oil and coal run out before we tackle that.

---

*Thomas Edison to his friends Henry Ford  
and Harvey Firestone (1931)*



# Thank you for your attention.

Questions?



**REC**

ENERGIZING LIFE TOGETHER