



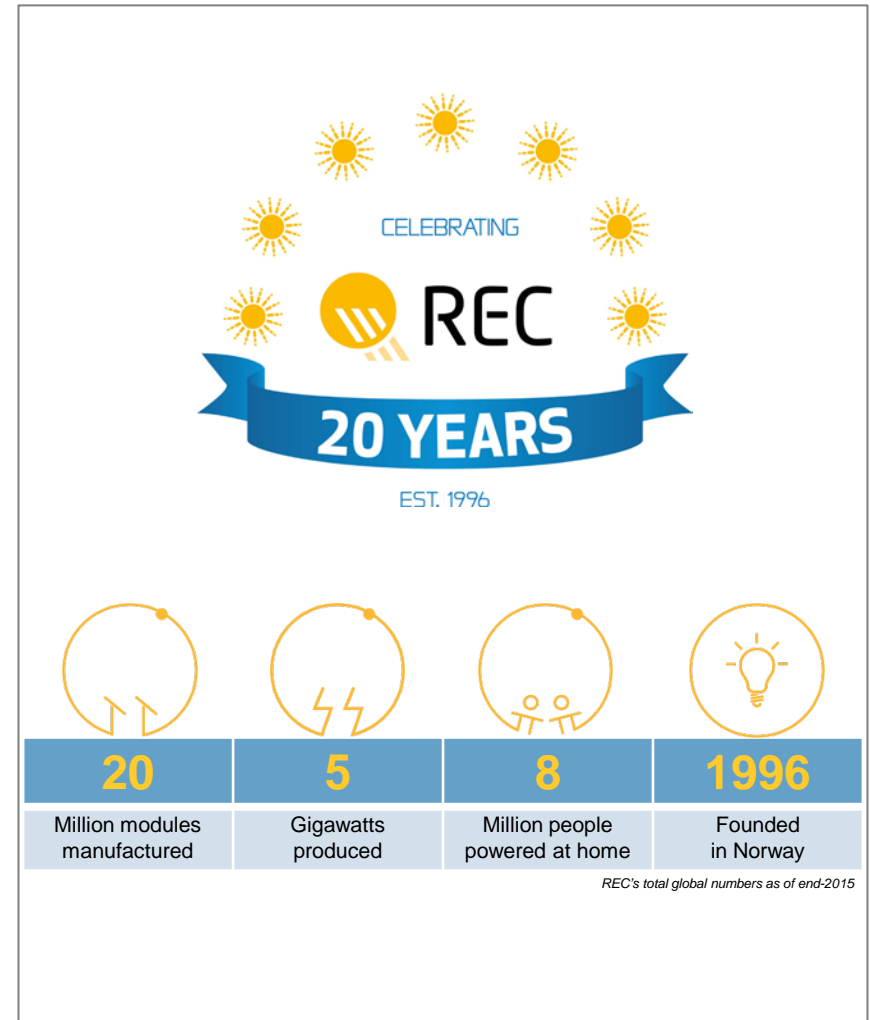
REC'S SOLAR MARKET INSIGHT

Q3 2016



ENERGIZING LIFE TOGETHER

- The core focus of REC is the **sustainable production of clean energy products** – growing from a pioneer in the solar industry, to a world leader
- REC's combination of **product quality, company reliability**, and commitment to **sustainability** is unparalleled in the solar PV industry
- With **20 years** in the business of solar power, REC has demonstrated **longevity** in an industry where many players quickly come and go



- 1 REC Highlights – Q3 2016
- 2 Global Performance – Q3 2016
- 3 Regional Performance – Q3 2016
- 4 Product and Technology Highlights

REC Q3 2016 Highlights



- REC had a solid performance in Q3 2016 despite challenging market conditions, with module shipments **totaling 276 MW**
- Once again, the **U.S.** accounted for the **majority of REC shipments** in Q3 2016 with a **60%** share
- The **APAC region** performed well with an **88% increase in shipments quarter-over-quarter**, mainly due to strong sales in India and Japan
- **The quarter saw the official opening of our Herøya ingot plant** with Norway's Prime Minister Erna Solberg cutting the ribbon
- REC successfully **launched its new 72-cell version of the award-winning REC TwinPeak Series**, rated up to **340 Wp**
- **REC achieved an in-house record cell efficiency of 20.46%** for multicrystalline solar cells, with over 20% efficiency expected in **mass production starting in early 2017**



Promotion of Shankar Sridhara to Vice President, Technology

- REC is pleased to announce the **promotion of Shankar Sridhara** to the position of **Vice-President, Technology**
- Mr. Sridhara will be responsible for **defining and driving REC's technology vision** – including all aspects of the company's **technology roadmap and research & development programs**
- Mr. Sridhara holds a Ph.D in Physics from University of Pittsburgh (Pittsburgh, PA, USA) and has joined REC in 2006 at REC ScanModule AB in Glava, Sweden.
- Over the 10 last years, he focused on product design, cost, reliability and field performance, leading for example to the successful development and industrialization of the REC TwinPeak product family





1

2

3

4

2.2 MW, Singapore

REC Highlights – Q3 2016



Opening of ingot facility in Herøya, Norway

- Production of ingot blocks at facility in Herøya, began on **September 13, 2016** and Elkem Solar hosted an opening ceremony to commemorate the event
- Norwegian **Prime Minister Erna Solberg did the ribbon cutting**
- **Also present were** Helge Aasen (Chairman), Geir Ausland (Plant Director), and Steve O'Neil (CEO)
- Elkem Solar uses an advanced, highly automated process to produce a **high purity silicon block**
- **Production of this solar-grade silicon** requires only 25% of the energy consumption and CO₂ emissions of polysilicon produced using the Siemens process – leading to **one of the lowest carbon footprints in the industry**



REC to provide panels for Canal & Suspended Structure project in the state of Punjab (India)

- REC to supply **5.3 MW of modules for a canal project** in the state of Punjab, planned for commissioning in January 2017
- **Unique features of this project** include:
 - To be implemented with a **suspended structure**
 - **First canal project with private sector investment in India**
- The solar PV modules will cover the canal and canal banks to produce **eco-friendly power** while **minimizing the use of valuable land** compared to typical large-scale ground-mounted solar PV systems



REC donates solar system for the innovative Singapore Sustainability Academy

- **REC** has **donated** a solar system to the newly founded **Singapore Sustainability Academy**
- The **launch** took place on August 5, 2016 with **Dr. Amy Khor** (Senior Minister of State, Ministry of the Environment and Water Resources) as the **Guest of Honor**
- The solar PV system, **designed and built by REC**, is expected to **fulfill** most of the **energy needs of the Academy**
- The project partnership is a natural fit for both parties, and is aligned with REC's goals of **promoting a low-carbon economy based on resource-efficient and sustainable practices**
- The construction is expected to be completed by mid-2017





15.53 MW, Kaua'i, USA

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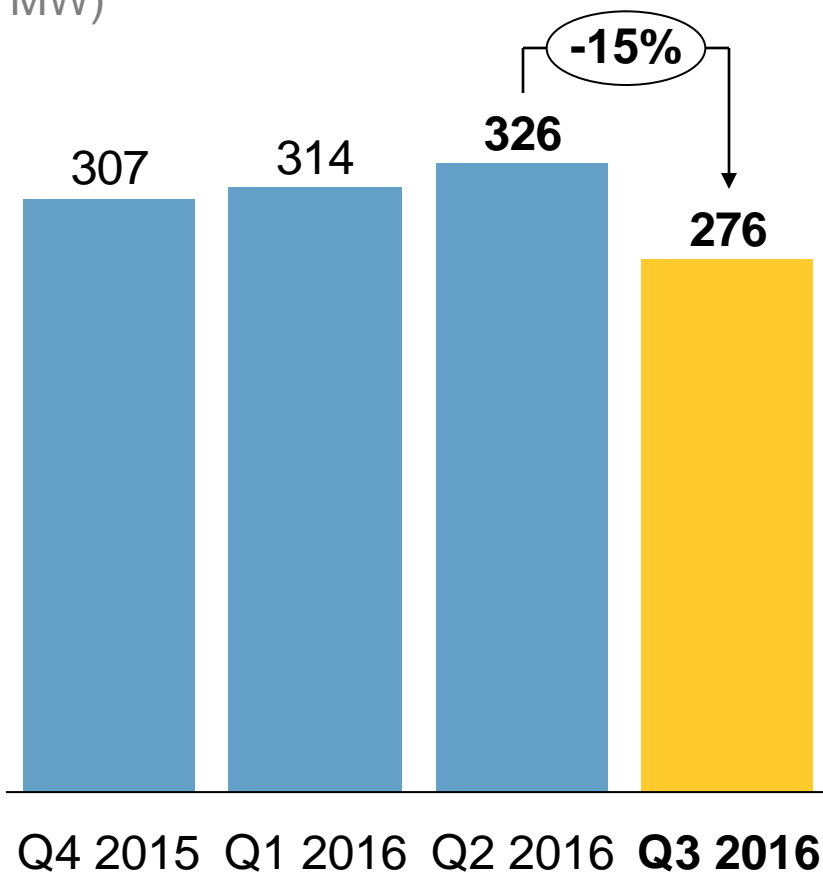
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Global Performance – Q3 2016



REC saw a drop in shipments due to a very challenging quarter for the entire industry

Module Shipments by Quarter
(in MW)

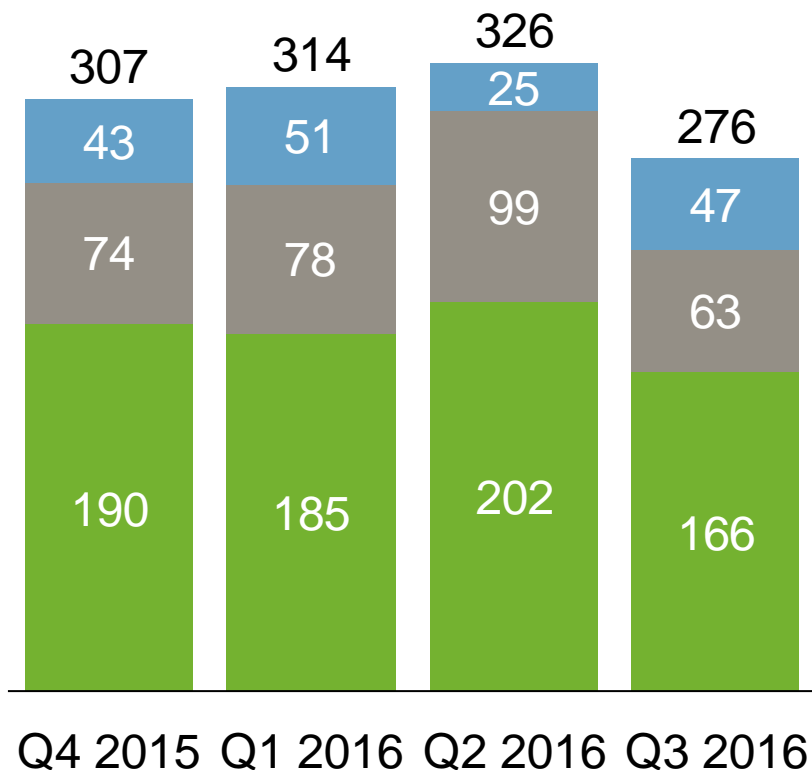


- **Q3 2016** module shipments totaled **276 MW**
- Quarterly volume decline by 15% compared to Q2 2016 as **REC emphasized profitability over chasing market share**
- Strong outlook for the remainder of the year

In Q3 2016, 60% of REC's shipments were to the U.S., with APAC performing great as well



Module Shipments by Region (in MW)



- Once again, the **U.S.** accounted for the **majority of REC shipments** in Q3 2016 with a **60%** share
- The **APAC region** performed well, with an **88% increase in shipments quarter-over-quarter** due to a strong performance in **India and Japan**
- **U.S.** shipments **declined by 18%** quarter-over-quarter
- Shipments to the **EMEA region fell by 36%** compared to Q2 2016 although **Germany remained very strong for REC**

* Excluding China



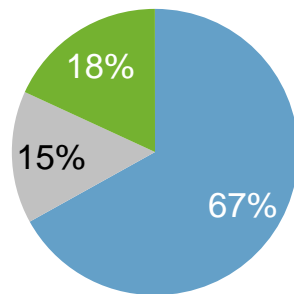
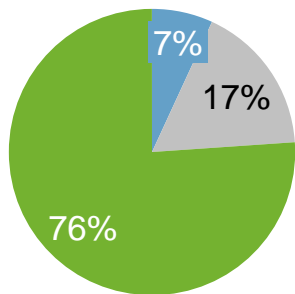
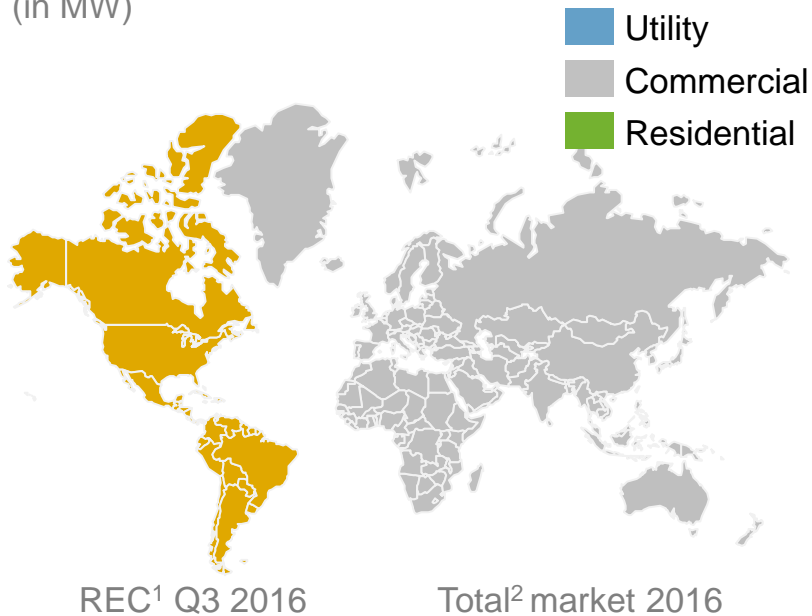
24 MW, Canino, Italy

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Regional Performance Q3 2016



Q3 2016 Module Shipments split by Segment (in MW)



REC Performance Highlights

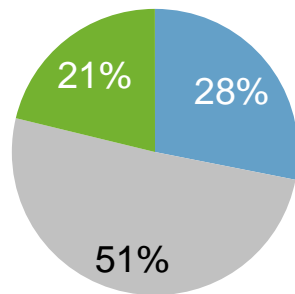
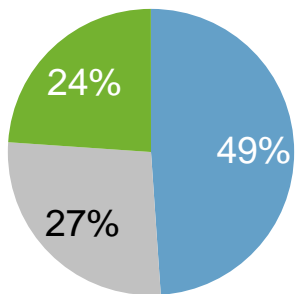
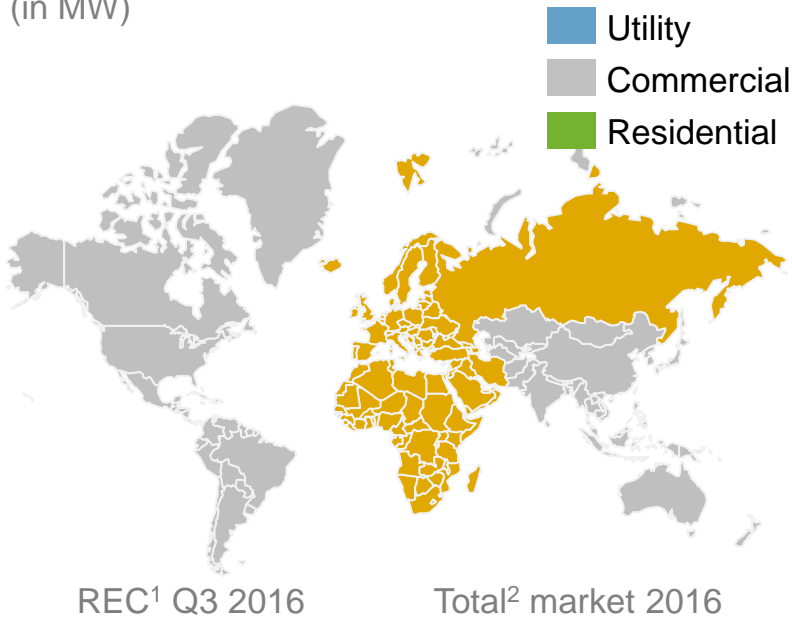
- **60% of Q3 2016 total REC shipments were delivered to the U.S.**, the 2nd largest market globally
- The high quality of REC's products was evidenced by the following accomplishments in the US market:
 - **#1 most popular panel brand for residential installations in California**
 - **#2 most popular panel brand for residential installations in the entire U.S.**³
- REC completed supply of 800,000 panels for the 258 MW Tranquility project in California, brought into commercial operation by Recurrent Energy
- Continued and growing interest in Latin America for REC products

U.S. Market Development Highlights

- **Project spillover into 2017** due to ITC extension
- **Community solar** emerging as driver for increased solar PV deployment
- **Net metering policy certainty needed** to ensure ongoing growth in residential and commercial installations

¹ REC market segment module shipment volume splits are best estimates; ² Total market estimate; ³ Based on 1H 2016, published September 2016

Q3 2016 Module Shipments split by Segment (in MW)



REC Performance Highlights

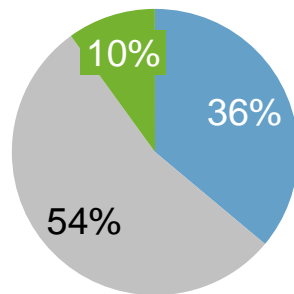
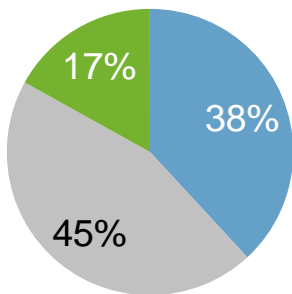
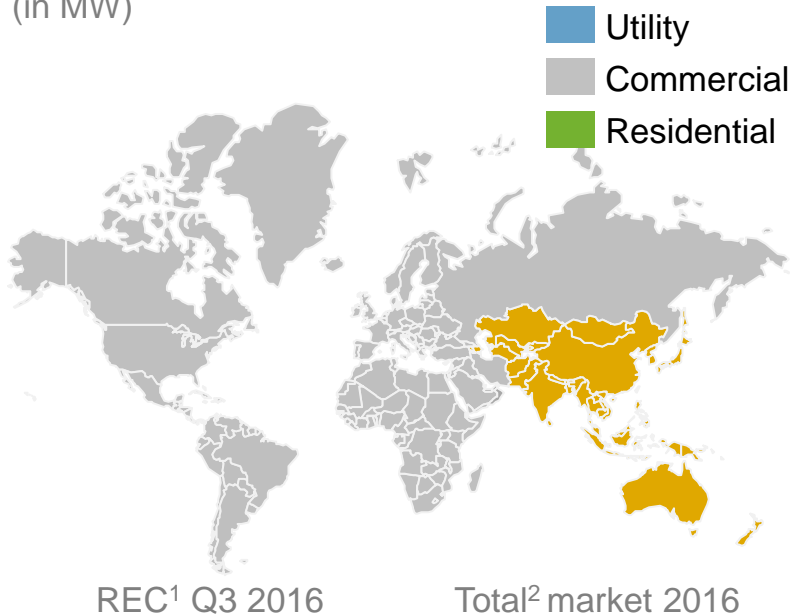
- Shipments to the EMEA region declined by 36% from the previous quarter and 22% year-over-year
- **Strong performance in Germany, solid performance in the U.K. and Netherlands**
- REC has increased its presence **in the utility segment** in Europe while performing well in the **residential and C&I segment** due to its **excellent customer service and high level of customer trust**

EMEA Region Development Highlights

- An increasing number of markets announced **auctions for solar PV procurement** (incl. the 1st cross-border PV auction between Germany and Denmark)
- Latest numbers illustrate that **concerns** regarding **grid stability** due to the increasing share of intermittent renewable energy sources are **overstated** – e.g. Germany: higher grid stability than 10 years ago, while the electricity generation from renewables increased to almost a third of the total

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

Q3 2016 Module Shipments split by Segment (in MW)



REC Performance Highlights

- **Very strong performance in India**, with REC increasing its footprint in the market (e.g. REC supplying 5.3 MW modules for a canal project in the state of Punjab)
- **Japan shipments were solid**, but affected by the **overall slower market conditions**
- REC sales into **Taiwan increased** as the market offers strong potential due to the preference for **high-performance products**

APAC Region Development Highlights

- The **Indian solar market** continues its **strong development** with the government announcing **support measures** for the **domestic PV manufacturing industry**
- **Taiwan** introduced **feed-in tariff rates**, providing a **bonus** for the usage of adopting **high-efficiency modules**; The Taiwanese government aims at a 20% share of renewables in country's energy mix by 2025

¹ REC market segment module shipment volume splits are best estimates; ² Total market estimate (ex. China)



573 kW, Dubai, UAE

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- 3
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Product and Technology Highlights



REC successfully launched its new 340 Wp 72-cell version of the award-winning REC TwinPeak module



- REC TwinPeak 72 is **based on the award-winning 60-cell REC TwinPeak Series**, combining key technologies: **half-cut cells, PERC, four busbars and split junction box**
- REC TwinPeak 72 is available globally and certified for a maximum system voltage of 1000V, with a 1500V variant also available
- Immediate benefits of this 72-cell REC TwinPeak module include:
 - **Lower balance of system costs**
 - Higher yield via **increased power output (around 20 Wp)** compared to standard 72-cell products
 - **Improved performance in shaded conditions**



REC achieves milestone efficiency for multicrystalline solar cells



- REC achieved a **multi-crystalline solar cell efficiency of 20.46%** and expects to see an average efficiency **above 20% in mass production from the beginning of 2017**
- This achievement illustrates REC's focus on **technology leadership and commitment to delivering the greatest value to our customers worldwide**
- REC is the **first known manufacturer to successfully achieve such a high cell efficiency on a multicrystalline platform for industrial-scale production**
- *“REC continuously strives to develop new products and processes that provide customers with high quality, high power, and high value solar panels,” says Steve O’Neil, Chief Executive Officer at REC.*



REC engineer sets industry standard for solar PV module degradation modeling

- As part of REC's obligation to strive for **best performance**, we are actively investing into **data modeling and data analysis**
- The degradation analysis focuses on **weather conditions and systematic drifting** as causes for large **uncontrollable fluctuations in operational data** – representing challenges for calculating degradation rates of solar PV modules
- The REC method – **new numerical Two-Step Approach** (“*TSA*” *method*) – is able to overcome these analytical challenges
- “Degradation analysis of photovoltaic modules based on real operational data is essential to the future development of the PV industry” by REC has been **presented at the International Conference on New Energy and Future Energy System**





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)*



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