Research & Development

Developing and refining the technologies and processes that help us lead our industries in quality

The OCI R&D Center is our hub of innovation. Building on a core technical foundation in chemicals and chemical engineering, the center's multi-disciplinary expertise today spans the electrical, mechanical, metals, and nanomaterials fields, enabling our businesses to achieve their cost reduction goals, prepare products and processes for commercial production, and create the innovative products that will drive future growth and profitability.



Strategy

In 2015, we initiated a fundamental shift in our R&D priorities from the long-term to the short-term with a focus on cost innovation. We are now investing 60% of our resources into working closely with each business and production site to achieve the cost reductions that will give OCI products an edge in today's increasingly competitive markets. In the mid-term. we will invest 30% of our resources into pursuing a diversification and differentiation strategy focused on developing new products to meet the needs of our customers and enhancing general competitiveness to grow existing businesses. In the long-term, we will invest 10% of our resources into expanding our core technology portfolio and developing the basic technologies that will enable us to bring new value-added consumer products and business models to market.

2015 activities

As mentioned earlier, our priority in the short-term is on cost reduction. Key successes in 2015 included a 25% reduction in energy consumption for our polysilicon manufacturing process and the successful adoption of our proprietary material improvement technology to other chemical and carbon black production processes.

Mid- and long-term initiatives also received substantial attention and resources in 2015. In the basic chemicals field, we launched a chemical innovation initiative to explore opportunities to enhance the competitiveness through innovations in core processes and identify potential areas for new product development. In the carbon black field, we focused on strategically bolstering the technical capabilities of our carbon black business as part of a mid-term initiative to expand our specialty black product lineup with an emphasis on close collaboration with tiremakers. In the energy field, we launched new projects focused on integrating renewable energy generation and energy storage systems to deliver total energy solutions. We also opened our first overseas R&D center in the city of San Antonio, Texas in the US in collaboration with our US subsidiaries.

2016 plans

Building on the momentum of our new short- and mid-term focused strategy, we will continue to expand our collaborative framework with our businesses to steadily reduce manufacturing costs for existing products as we also pursue R&D on new products that have a high probability of generating revenue in the mid-term. We will also be taking a multi-disciplinary approach to tackling the fundamental challenge presented by ultra-low oil prices to ensure the continued competitiveness of our businesses.

Intellectual property

In 2015, we applied for 50 patents and registered 46 business secrets, for a combined average of more than one registration per researcher. We intend to continue to improve the quality of our patent portfolio by stepping up prior art research and claim reviews of all existing patents in response to a number of claims that have been invalidated.

In 2016, our focus will be on enhancing our ability to manage our intellectual property by implementing and launching a new IP management system.

We will also conduct IP training to help our researchers think strategically about patents as we leverage these valuable assets to strengthen the competitiveness of OCI products and contribute to the bottom line.

Patents granted

Total	163
Rest of world	43
Korea	120

Patent applications

Total	245
Rest of world	135
Korea	110

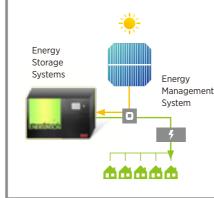
2015 patent applications

Total	76
Rest of world	26
Korea	50

Global R&D network

We took the first step in our global R&D network initiative in 2015 by setting up our US R&D center in San Antonio, Texas. The center's focus is on fostering collaboration between clients and OCI subsidiaries OCI Solar Power, Mission Solar Energy, and Sun Action Trackers with a focus on innovation in the energy business. We plan to expand our R&D network in 2016 by co-developing energy storage system technologies with top companies, universities, and research institutes in the US. This fledgling global network will position us to secure propriety know-how, gain insights on new trends in technology, and recruit top talent from leading local universities.

Energy storage systems



In July 2015, we completed development of a leakage-free 125 kW/250 kWh containerized vanadium redox flow battery (VRFB), a key milestone in our roadmap to commercialize energy storage systems. Through structural analysis and efficiency optimization of the stack and balance-of-plant equipment, we achieved commercial-level system energy efficiency and crucial operational knowhow. We are currently collaborating with

core component developers to pave the way for commercial production. Future tasks will include optimizing energy efficiency and lowering manufacturing costs to ensure we are competitive in the marketplace as we integrate renewable power generation and energy storage systems to bring integrated energy solutions to market.

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