

**Kyocera IR Day**  
**(Held on November 28, 2019)**

**Speech by Hideo Tanimoto, President and Representative Director,  
Kyocera Corporation**

**<Cover>**

Today I will explain Kyocera's efforts to drive medium- and long-term growth.

**<1. Major Initiatives since FY3/2018>**

To begin, I will discuss the major initiatives we have undertaken since I was appointed president.

**<2. Maintain Aggressive Approach to M&A>**

This slide provides a list of the merger and acquisition (M&A) activities we have decided on and implemented since the year ended March 31, 2018 ("fiscal 2018") and up until October 2019. In the Components Business and Equipment & Systems Business, we conducted M&A in Japan and overseas aimed at further strengthening existing businesses.

After entering the year ending March 31, 2020 ("fiscal 2020"), we undertook a total of five M&A projects in the three domains of fine ceramic parts, industrial tools and document solutions. Although the effect of macroeconomic factors has made performance difficult in each of these businesses, they all have high margin profile and we expect sales and profit to increase alongside market recovery.

Next, I will explain progress in energy business initiatives.

**<3. Develop Energy Business>**

Kyocera aims to expand the energy business by shifting business focus from "selling goods" to "selling services" in preparation for the advent of an era of self-consumption of renewable energy.

The top half of the slide describes our new business model that reduces the initial investment burden on individual users and power service providers. We will promote the introduction of renewable energy by taking advantage of Kyocera's exceptional credibility to develop long-term service businesses.

The bottom half of this slide shows the new products supporting demand for the self-consumption of energy for condominiums and apartment buildings.

Although many companies have released energy-related products and entered the power service industry, even higher levels of quality and service sustainability are required to meet the need for self-consumption. Kyocera has a proven record in long-term business and product quality as well as the financial strength to enable stable and sustainable management. I believe this provides us with a competitive edge with a business model from a long-term perspective. We will make the most of this advantage and promote full-scale development of the energy business.

Next, I will explain R&D activities.

#### **<4. Strengthen R&D Activities>**

In R&D, we have been creating a cross-organization development system for each core theme since the fiscal year ended March 2019 (“fiscal 2019”) and consolidated the three R&D sites we had in the Kanto area into the Minatomirai Research Center in May 2019.

The first and sixth floors of this building include co-creation spaces encouraging exchange with people from outside the organization. In addition to in-house development, we are promoting open innovation aimed at developing new products and businesses.

#### **<5. Initiatives for Further Growth>**

Kyocera is taking steps to expand business and improve profitability in this way and we are striving to secure business opportunities in the 5G, Advanced Driver-Assist System (ADAS) and Internet of Things (IoT) domains to drive further growth.

Today I will focus on initiatives in the energy market and progress made in the mobility business where we are pushing ahead with business creation mainly in automotive-related areas.

**Speech by Ichiro Ikeda, General Manager,  
Solar Energy Marketing Division, Corporate Solar Energy Group & Energy Business  
Strategy Division, Corporate Management Promotion Group, Kyocera Corporation**

#### **<6. Strategy of Energy Business>**

Let's look at strategy of the energy business.

#### **<7. Agenda>**

Today I will explain KYOCERA ENERGY VISION 3.0 as a new business development based on our business background in energy as well as the KYOCERA ENERGY ACTION 2020 to achieve this.

## **<8. Toward a Sustainable Society: KYOCERA ENERGY VISION 3.0>**

First, let's look at KYOCERA ENERGY VISION 3.0, which seeks to realize a sustainable society.

## **<9. 40-Plus Year History of Solar Energy Business>**

Kyocera launched the solar energy business in 1975 and we have continued for more than 40 years. As you can see at the top of the slide, at the outset we initiated projects to provide a valuable source of energy to places without electricity such as a communications station at the top of a mountain and regions yet to introduce power. This marked phase one of the business, a period of independent power supply.

As shown at the bottom of the slide, entering the 1990s signaled phase two of the business, in which we started with grid-connection projects and then expanded business based on the feed-in tariff (FIT) system in Japan.

As a new development from 2019, we will expand our business domain under KYOCERA ENERGY VISION 3.0 to energy services based on renewable energy centered on solar power generation.

## **<10. Sustainable Society>**

First, let's look at what it means to be a sustainable society.

To realize a low-carbon society, recycling-oriented society and society in harmony with nature, and link these together, requires an approach aimed at resolving issues related to climate change, the ecosystem and environmental burden through renewable energy and an approach based on energy solutions.

## **<11. What is a Sustainable Society?>**

What is a sustainable society anyway?

In short, it refers to the realization of an economic system that grows and develops sustainably and is in harmony with the global ecosystem.

## **<12. Background to Energy Business: Toward a Sustainable Society>**

As the background to the development of our energy business supporting a sustainable society, in global terms we can point to the signing of the Paris Agreement, a framework for climate change, at COP21, and the setting of the United Nations Sustainable Development Goals (SDGs) toward the realization of a low-carbon society. The private sector is also making major

moves to reduce greenhouse gas emissions by companies and organizations

In Japan, shown at right, the government announced its energy mix projection for 2030 in which renewable energy will be a major source of power. This means increasing the ratio of renewable energy to 22-24%.

Conversely, the role of the FIT system, a measure used to promote the introduction of renewable energy, is coming to an end with the purchase price now lower than the market price of electricity.

This is a natural progression, however. Heightened global environmental awareness and efforts to promote the introduction of renewable energy have shown up limits in the FIT system and increased the competitiveness of solar power, otherwise known as photovoltaic (PV) power. This is in turn further driving renewable energy as a major source of power based on self-consumption and local production for local consumption.

### **<13. Toward a Sustainable Society: KYOCERA ENERGY VISION 3.0>**

Based on the aforementioned business environment, we will promote new business development based on a shift from selling goods to selling services under KYOCERA ENERGY VISION 3.0.

### **<14. New Business Development based on a shift from Selling Goods to Selling Services>**

First, as shown on the left of the slide, in 2019 we started a service for supplying power by installing PV systems on rooftops free of charge in both the residential and industrial sectors.

Also, to promote the self-consumption of electricity, we are developing a residential storage battery and fuel cell in-house. As shown on the right of this slide, going forward we will promote the optimization of energy in a region as well as local production for local consumption and stabilize the level of surplus power from residences and companies as well as power from mega-solar facilities using large storage batteries. In addition, power from Virtual Power Plants (VPPs) that utilize the capacities of distributed storage batteries like a single storage battery will be used to provide energy-related services.

Kyocera can handle the energy management of a region by linking with mobility and the IoT and through VPP control, self-consignment and peer-to-peer (P2P) power supply.

### **<15. New Business Development based on a shift from Selling Goods to Selling Services>**

With the shift from selling goods to selling services as a new business development, Kyocera

can maximize the effects of its competitive advantages in terms of long-term reliability and long product life. These features make it possible to run a business over the long term and provide competitive service pricing.

First, I will explain our rooftop PV power supply service that we started in 2019 as a first step. Services got underway in October. The electricity market can be divided into extra-high-voltage (EHV), high-voltage (HV) and low-voltage (LV) in line with liberalization of the electric power market. We established Kyocera EPA LLC. (Kyocera EPA) to cater for companies use EHV and factories and mid-sized companies use HV, stores and the like, while Kyocera Kanden Energy LLC. (Kyocera Kanden Energy) was established to cater for the residential sector, where the scale of the market is large. Both companies are making business proposals in their respective domains.

### **<16. New Business Development based on a Shift from Selling Goods to Selling Services>**

As shown in the diagram on the left, in the industrial sector, Kyocera EPA leases equipment to service providers and the service providers sell the electricity generated by the PV system installed on the roof of the client company. In terms of merits, the company can install the PV system at no initial cost and the provider can reap the benefits of a long-term transaction with the company. This scheme was created based on recognition of Kyocera's corporate appeal, reliability and product quality.

As shown on the right of the slide, in the residential sector, Kyocera Kanden Energy installs a PV system on the roof of a residence at no cost, as shown in the top of the diagram, and provides a service in which only the power generated is sold. At the same time, general electricity from the grid is supplied. There is no initial cost for the customer and equipment ownership rights are transferred to the customer at contract maturity.

Both power from the PV system and power from the grid are supplied at rates that are attractive to customers. In addition, power generated by the PV system can be used in a blackout, increasing the resilience of the home. We are in the start of a new business with the introduction of these two power services.

### **<17. Development of Energy-related Services>**

Kyocera will promote development from power services to energy-related services. Specifically, we will provide services that bring peace of mind to communities. These services will include supplying power to regions based on the local production for local consumption of energy, aiding in eco-friendly lifestyles through such means as net-zero energy housing (ZEH) and net-zero energy buildings (ZEB), conducting relative power trading through P2P, providing electric

vehicle services for the community and ensuring power supply in an emergency. We will also create regional infrastructure for energy services such as for the utilization of electric vehicles for the 5G era. By doing so, we aim to create an independent, decentralized society toward the realization of an economic system that grows and develops sustainably and is in harmony with the global ecosystem.

Kyocera has the technological resources concerning energy, mobility, communications and IoT, all features that are indispensable to this goal. We will look to link and use these resources organically to help us reach our objective.

#### **<18. KYOCERA ENERGY ACTION 2020>**

Next, I will explain the residential storage battery and fuel cell that we finished developing under KYOCERA ENERGY ACTION 2020.

#### **<19. Value-Added Product for Residential Business>**

First, with regard to our value-added product for the residential business, the standardization of energy-saving houses based on ZEH is a precondition for the 2030 energy mix that I mentioned earlier.

The diagram on this slide depicts an evolutionary model of an integrated power supply/demand system. Increasing self-consumption by charging surplus power generated by the PV system and fuel cell into the storage battery alleviates burden on the power grid and contributes to more eco-friendly homes.

#### **<20. Value-Added Product for Residential Business>**

In case of emergency or blackout, the combination of PV system and fuel cell with storage battery can ensure power for a long period, day or night and dramatically improve the resilience of the home.

As shown at the bottom of this slide, in the future we expect to see the standardization of this framework as a means to realize houses that consume zero energy and link the PV system with storage batteries and electric vehicles with the surplus power being used to balance the supply and demand of power from the grid and ensure lifestyle resilience in a blackout. There is still plenty of potential for proliferating PV systems by promoting their combination with storage batteries and fuel cells.

#### **<21. Value-Added Product for Residential Business>**

I will now introduce “Enerezza” as a value-added product for the residential business. This is a new style of power storage system that uses a clay-type lithium-ion energy storage system

made by Kyocera, a world-first technology.

As shown at the bottom of this slide, we plan to launch a small-volume pilot line in January 2020 and a mass-production line capable of 20,000 units a year in October 2020.

### **<22. Value-Added Product for Residential Business>**

I will now explain the features of the clay-type lithium-ion energy storage battery. The left of the slide provides a comparison of a conventional lithium-ion energy storage battery with the clay-type system. The main feature of the clay-type system is the significant reduction in material costs due to the development of thick coating technology for clay-type electrodes. By making the electrode 3-5 times thicker than conventional lithium-ion storage batteries, it is possible to reduce the cost of materials such as current-collecting foil and separator by approximately 30%.

Further, we have made major improvements in the basic features indispensable to energy storage batteries for the home, namely exceptional safety and long life, as shown at right, and it is now possible to prepare a plan to significantly expand the business by developing a competitive Kyocera-made storage battery.

### **<23. Value-Added Product for Residential Business>**

I will now turn to the compatibility of the clay-type energy storage system with PV systems and its ability to operate independently in an emergency. The clay-type energy storage system uses a mono-function power converter that can be retrofitted to an existing PV system and functionally linked.

As shown at the bottom of this slide, the system automatically switches to independent operation in an emergency and the necessary power can be continuously supplied with its large capacity of up to 15kWh. When combined with a PV system, it can be charged in the daytime by using independent operation mode of PV system, making it useful in prolonged blackouts.

As shown in the diagram, when fully charged with a 15kWh system, it can continuously supply the power necessary for living for up to 47 hours, meaning people can carry on with their everyday lives with peace of mind even when a disaster strikes.

### **<24. Value-Added Product for Condominiums and Apartment Buildings>**

Next, I will introduce the "ENE-FARM mini" residential 400W SOFC (Solid Oxide Fuel Cell) system as a value-added product for condominiums and apartment buildings. "ENE-FARM mini", launched on October 30, 2019 by Tokyo Gas Co., Ltd., is the world's smallest residential fuel cell.

### **<25. Value-Added Product for Condominiums and Apartment Buildings>**

The sale, development and production of “ENE-FARM mini” are being handled by an alliance of four companies, as shown at left.

In a clockwise direction from upper right, Tokyo Gas is responsible for marketing and sales, Kyocera for cell stack/system development, Dainichi Co., Ltd. for fuel cell unit design/production and PURPOSE, CO., LTD. for the control of heat source equipment/hot water in the SOFC system.

### **<26. Value-Added Product for Condominiums and Apartment Buildings>**

This slide outlines the composition and features of the “ENE-FARM mini” system. On the left you can see product composition and on the right four product features.

First, it boasts the world's smallest size, enabling installation in limited space and condominiums. Second, it displays advanced power generation performance, realizing a world-class power generation efficiency of 47%. It is also eco-friendly and has high resilience, features that I will explain with the next slide.

### **<27. Value-Added Product for Condominiums and Apartment Buildings>**

In addition to the top-class power generation efficiency of 47%, the eco-friendly “ENE-FARM mini” shown on the left of the slide uses waste heat to make hot water, resulting in a high primary energy usage rate of 80% and therefore effective utilization of energy. The system also reduces CO<sub>2</sub> by one ton a year due to the high primary energy usage rate.

On the right of the slide, you can see that the system can be used for heating and hot water in a blackout in the case that city gas is being supplied while it can also supply up to 400W of power from a dedicated power outlet during a blackout. The appliances shown at the bottom of the slide can be used in an emergency such as a blackout.

As demonstrated above, we will use our feature-filled power storage batteries and fuel cells to add value with our residential business.

### **<28. Toward a Sustainable Society>**

Finally, Kyocera will promote new business that centers on supplying services under KYOCERA ENERGY VISION 3.0 and develop distinctive products for this purpose with the aim of realizing a sustainable society.



**Speech by Yasuhiro Satake, Senior Manager, Mobility Business Strategy Department,  
Mobility Business Strategy Division, Corporate Management Promotion Group,  
Kyocera Corporation**

**<29. Strategy of Mobility Business>**

I will now explain strategy of the mobility business.

**<30. Agenda>**

Today, I will explain the environment surrounding mobility, Kyocera's mobility-related businesses and initiatives to resolve social issues related to mobility.

**<31. Environment surrounding Mobility>**

First, I will explain the environment surrounding mobility.

The auto industry is currently undergoing a once-in-a-century revolution, and the advancement of the CASE concept, which refers to "Connected" cars, "Autonomous" driving, "Shared" and "Electric," is leading to dramatic change in product composition, value chain and business model.

In addition, Mobility as a Service, or MaaS, in which mobility is viewed as a service, has been gaining attention, with a wide array of industries such as railroad and communications in addition to the automobile industry working closely together to find solutions to social issues related to mobility.

Kyocera realizes it needs to tackle tough challenges head on without fear of failure in order to take advantage of the opportunities that this provides.

**<32. Environment Surrounding Mobility>**

Mobile networks undergo major revolutions every 20 years. From the 1980s to the start of the 2000s saw the advent and proliferation of mobile phones. The 20 years since 2000 has seen the start of mobile internet from i-mode and then the dramatic spread of smartphone usage. From 2020, we will see the start of 5G service.

5G has the features of being high-speed, high-capacity, low latency, and allowing simultaneous multiple connections, and realizes high quality enabling the potential resolution of various social issues. It can also be used as a private network. This makes it possible to use 5G when tackling social issues related to mobility.

**<33. Environment surrounding Mobility>**

Next, I will explain the social issues related to mobility, which are closely connected with the

SDGs adopted by the United Nations

Some examples include chronic traffic congestion, inadequate public transportation for vulnerable citizens and an increase in fatalities caused by traffic accidents.

In order to resolve these issues, it is necessary to integrate related technologies that include a solution requiring optimization of traffic volume using information and communications technology (ICT), a traffic system that ensures freedom of movement and one that enables safe movement.

It is essential to resolve these issues in order to realize a sustainable society in which all people can move cleanly, freely and safely.

#### **<34. Agenda>**

Next, I will explain Kyocera's mobility-related businesses.

#### **<35. Mobility-related Products Supporting Growth>**

Mobility-related products supporting Kyocera's growth contribute to the environmental, informational and safety aspects of automobiles.

From an environmental perspective, we provide products that contribute to energy conservation through improved fuel efficiency such as glow plugs and LED packages.

From an informational perspective, we supply from communications modules to display devices such as Cluster LCD and Heads-Up Display (HUD) units that are indispensable to connected cars.

From a safety perspective, we have a wide range of products that include view cameras and millimeter-wave substrates. In particular, in the field of safety, we are actively promoting the development of technologies and products for ADAS and autonomous driving, areas that are growing globally.

The products highlighted in red inside the red border, namely the stereo-camera, Camera-LiDAR fusion sensor and FIR camera, are currently under development and are expected to manifest strong growth going forward.

#### **<36. Sales Revenue of Mobility-related Businesses>**

Let's turn to sales revenue in Kyocera's mobility-related businesses. Total sales revenue of mobility-related products mentioned earlier is increasing steadily with a compound annual growth rate (CAGR) of 11.5% expected between the fiscal year ended March 2013 and fiscal year ending March 2021("fiscal 2021"). Kyocera aims to achieve 300 billion yen in sales

revenue in fiscal 2021.

### **<37. Development of Concept Car for the Future>**

Next, I will explain the project to develop a concept car that the Corporate R&D Group has been working on.

This project brings together Kyocera Group technologies with the aim of enhancing the level of in-vehicle technology. Advanced devices were actually installed in GLM's Tommykaira model as part of the project with the technology and knowhow born from this used in product development. The concept car was exhibited at Automotive Engineering Exposition Yokohama 2018 and CEATEC 2018.

Going forward, we will strive to raise the level of in-vehicle technology and thus strengthen our competitiveness through these initiatives.

### **<38. Mobility-related R&D>**

Kyocera is also conducting R&D related to mobility. The AI recognition camera in the top left of the slide has in-built AI that realizes advanced recognition, including object detection and free-space detection.

The FIR camera at lower left enables object recognition that is not affected by light source since the infrared rays emitted from an object can be visualized.

The Camera-LiDAR fusion sensor at upper right realizes fusion sensing by way of a uniform optical axis between camera and LIDAR made possible through a unique optical system.

In addition to in-vehicle devices, we are also working on development for installations on the infrastructure side.

At lower right, the V2I Roadside unit enables communication with various devices to provide information on nearby automobiles and pedestrians through stable wireless communication and multi-protocol compatibility. The aim is to reduce traffic accidents.

### **<39. Agenda>**

Next, I will introduce initiatives to resolve social issues.

### **<40. Toward Resolution of Social Issues (1)>**

Maintaining local public transport is now a major social issue. In rural areas, depopulation, an aging population, a shortage of drivers, especially for buses, and natural disasters have significantly impacted public transport.

In particular, the Great East Japan Earthquake caused immense damage. Coastal railway lines were damaged in the tsunami and tracks were washed away. Since restoration would cost huge sums of money and take a long time, East Japan Railway Company (JR EAST) adopted a high-speed transport system for buses called BRT (Bus Rapid Transit) as an alternative means. Railroads were paved over and converted into roads exclusively for buses, making it possible to move people faster than regular bus routes.

However, there is still the issue of driver shortage in depopulated areas and it is necessary to resolve this problem to ensure continuous operation. JR EAST is examining the possibility of introducing autonomous driving technology to the BRT system as a way to resolve the dilemma.

#### **<41. Autonomous Driving with BRT System>**

Such social issues cannot be resolved by Kyocera alone. For that reason, we are implementing demonstration tests that involve open innovation.

Specifically, we participate in the Mobility Innovation Consortium led by JR EAST in which 10 companies including Kyocera and Kyocera Communication Systems Co., Ltd. (KCCS) have joined forces to test the viability of autonomous driving technology on BRT lines.

The photos show part of the demonstration test conducted on JR EAST's Ofunato Line in fiscal 2019.

Kyocera developed a machine to test the concept of a roadside unit in which position information and signal information required for autonomous driving is collected and transmitted to a self-driving bus on a BRT line. Although we have only given the test a basic evaluation, positive results have been gained thus far.

#### **<42. Autonomous Driving with BRT System>**

Tests of the self-driving technology for buses on BRT lines have been ongoing this fiscal year as well. As announced in a press release on November 8, we will conduct a demonstration test on the Kesenuma BRT line between November 2019 and February 2020.

In this test, we will use a large self-driving bus in conditions that closely mirror actual operation. The autonomous driving level will be level 2 equivalent and promote to develop achieving level 4 finally, and the driving control will be conducted wirelessly. The test will be run at a speed of 60km/h, the assumed speed for actual operation, and along a route of 4.8km, also the length assumed for actual operation.

Kyocera has been enabling control of autonomous driving through wireless communications

using its roadside units since 2018, and starting with this test will assist with road obstacle detection via its millimeter-wave sensors.

KCCS will also take part in the test with the creation of a private network using multi-hop technology. In concrete terms, it will establish a stable communications environment by connecting wireless communication in places difficult for the network to reach such as tunnels, by way of multi-hop technology. Although private networks are currently run through wifi, we aim to create private networks that are based on 5G in the future.

Kyocera's comprehensive capabilities support the realization of autonomous driving and will contribute to the early realization of self-driving on BRT lines. Finally, we will continue to expand the business to other railway companies with local lines facing similar issues.

#### **<43. Toward Resolution of Social Issues (2)>**

The second social issue concerns an increase in traffic accidents involving vulnerable citizens. In Japan, the declining birthrate and aging population have led to a high number of accidents caused by operating error by elderly drivers, accidents caused by children leaping onto the road and accidents at intersections with no traffic signals.

To reduce these kinds of accidents requires the support of safe driving through systems that do not rely on people such as ADAS and autonomous driving. However, there are limits to performance when looking solely at autonomous control using in-vehicle sensors, and a cooperative infrastructure system that uses unforeseen information that cannot be detected from the vehicle is required.

To realize this, it is necessary to install Smart Roadside units as infrastructure and enable cooperative control using signal information and dynamic information.

#### **<44. Cooperative Safe Driving Support System>**

Kyocera is looking into providing support for autonomous driving and safe driving through cooperative control related to pedestrians and automobiles in order to realize a cooperative autonomous driving and safe driving support system.

Roadside units collect and distribute dynamic information from nearby such as the location information of pedestrians and automobiles. Kyocera is examining the possibility of using FIR cameras that remain unaffected by weather or the intensity of illumination for the sensing of pedestrians and other objects, and roadside units with multi-protocol compatibility for transmitting the information to various devices. In particular, we believe we can help reduce the number of traffic accidents involving vulnerable citizens, for example by introducing the system at intersections without traffic signals on school routes. We will endeavor to amass

technology that supports autonomous driving and safe driving through our development and demonstration tests.

#### **<45. Development of Mobility Business>**

Finally, let me give a brief overview of development of our mobility business.

Kyocera will introduce a range of new product groups for use inside automobiles that can be applied to ADAS such as AI recognition cameras, FIR cameras and Camera-LIDAR fusion sensors, which will complement our existing lineup. We will also continue to sell telematics modules that are indispensable to connected cars.

In addition, we will conduct development through demonstration tests of autonomous driving on BRT lines that utilize roadside units equipped with sensing technology and wireless communications technology and that operate within a private network in order to realize a cooperative autonomous driving and safe driving support system.

Further, we will utilize the roadside units as a service platform and leverage such 5G features as low latency to contribute to the resolution of social issues related to mobility through systems and solutions that use 5G.

#### **Cautionary statement**

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