

November 28, 2019

# Kyocera IR Day

Hideo Tanimoto  
President and Representative Director

KYOCERA Corporation

## Major Initiatives since FY3/2018

**1 Maintain Aggressive Approach to M&A**

**2 Develop Energy Business**

**3 Strengthen R&D activities**

# Maintain Aggressive Approach to M&A

## Major M&A activities since FY3/2018

	FY3/2018	FY3/2019	FY3/2020
<b>Industrial &amp; Automotive Components Group</b> <b>Fine ceramic parts</b> ➤ <b>Strengthen production system and product lineup</b>			<b>H.C. Starck Ceramics</b> (Germany / Non-oxide fine ceramic components such as SiSiC* <sup>1</sup> ) <b>Friatec</b> (Germany / Oxide-ceramic components and metallized components) <b>Establishing a joint venture with Ube Industries</b> (Japan: December 2019 (plan) / Ceramic filters for 5G base stations)
<b>Industrial &amp; Automotive Components Group</b> <b>Industrial tools</b> ➤ <b>Expand business field</b>	<b>SENCO</b> (U.S. / Pneumatic tools) <b>Power tool business of Ryobi</b> (Japan)	<b>Van Aerden Group</b> (Netherland / Pneumatic tools)	<b>SouthernCarlson</b> (U.S. / Sales of tools)
<b>Electronic Devices Group</b> <b>AVX Corporation</b> ➤ <b>Expand business in telecom and auto-related market</b>	<b>Automotive sensor business of TT Electronics</b> (UK) <b>Ethertronics</b> (U.S / Small antennas for wireless communications)	<b>Kumatec</b> (Germany / Product automation)	
<b>Document Solutions Group</b> <b>KDC</b> * <sup>2</sup> ➤ <b>Create comprehensive services</b>	<b>DataBank</b> (U.S. / ECM, Document BPO)	<b>Alos</b> (Germany / ECM) <b>Janus</b> (Czech Republic and Slovakia / Sales & services)	<b>Huon IT</b> (Australia / ICT)
<b>Life &amp; Environment Group</b> <b>Medical devices</b> ➤ <b>Expand business in U.S.</b>		<b>Renovis</b> (U.S / Spinal products & artificial joint)	

\*<sup>1</sup>Silicon-Infiltrated Silicon Carbide

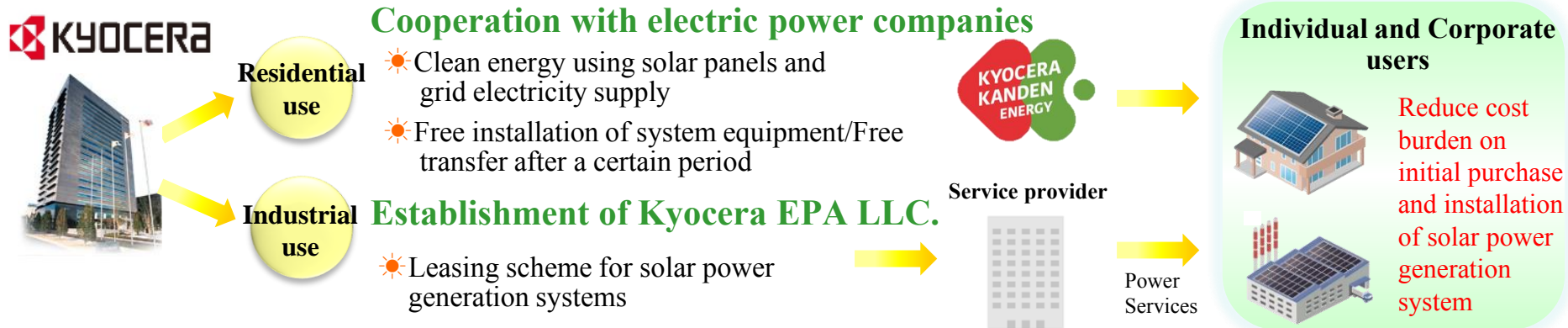
\*<sup>2</sup>Kyocera Document Solutions Inc.

# Develop Energy Business

New business development based on a shift from “selling goods” to “selling services”

New business model that reduces the initial investment burden on users and power service providers

Taking advantage of Kyocera’s exceptional credibility to develop long-term service businesses



Introduction of new products to the energy self-consumption markets Increase sales by expanding new product lineups

## Energy storage system for residential use: Enerezza

**CY2020~**



**Features**

- World's first <sup>\*1</sup> clay type li-ion energy storage system
- High safety, long life, low cost

**Enerezza**

**GOOD DESIGN AWARD 2019**

## Fuel cell for residential use: Ene Farm Mini

**Released in October**



**Features**

- World's smallest <sup>\*2</sup>, high power generation performance, environmental contribution and resilience

**ENE-FARM mini**

<sup>\*1</sup> As a type energy storage system. (Kyocera investigation (As of October 2, 2019))

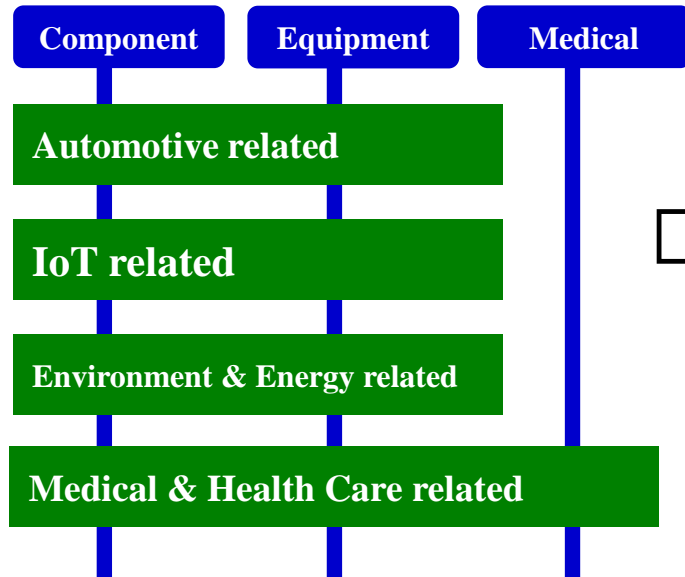
<sup>\*2</sup> In stationary household fuel cells (Kyocera investigation (As of October 10, 2019))

# Strengthen R&D Activities

**Strengthen software development and actively promote open innovation**

Create a cross-organization development system for each core theme since FY3/2019

## R&D Structure



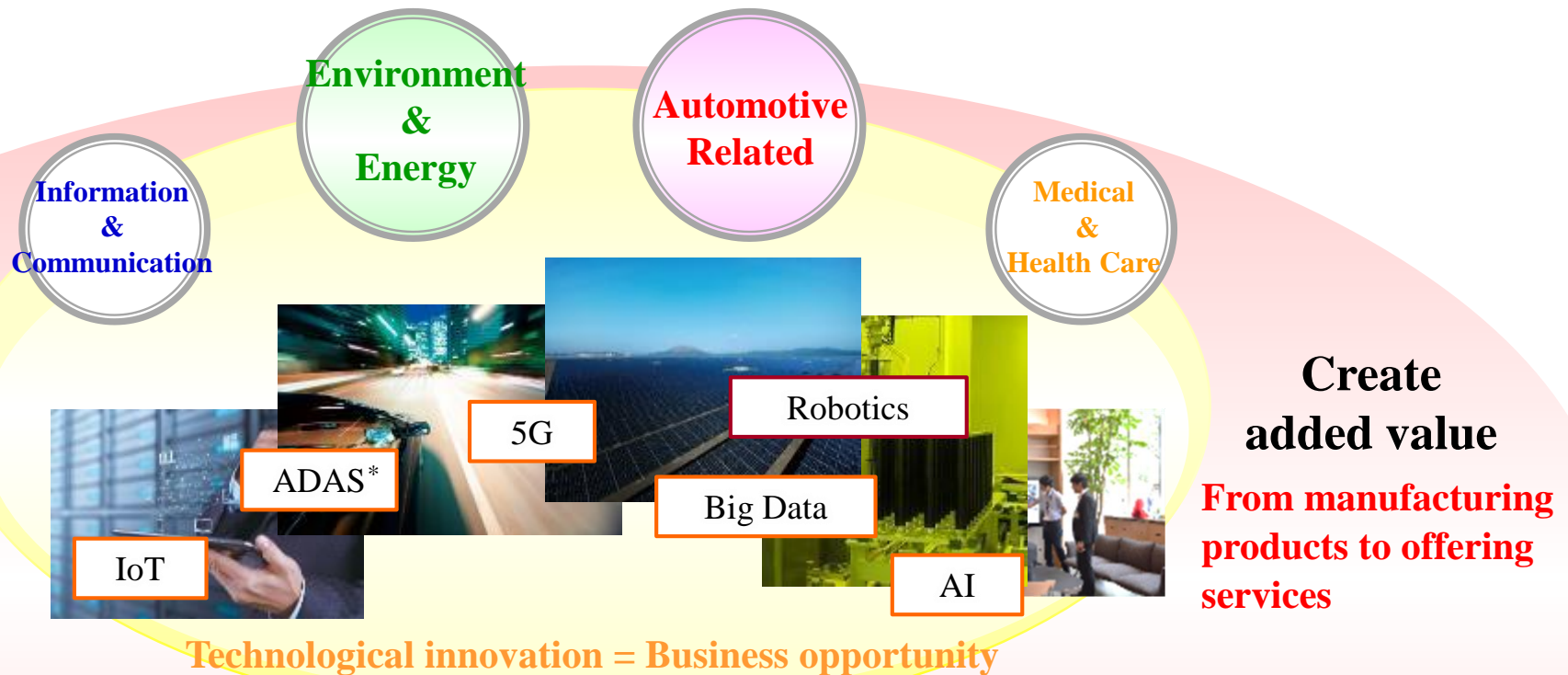
External collaborations



Kyocera's first successful crowdfunding campaign "Possi"

Minatomirai Research Center

# Initiatives for Further Growth



## Initiatives for business expansion

- 1 **M&A :**  
Further strengthen high-profitable businesses
- 2 **Pursuing Synergies:**  
Strengthen internal and external collaboration

## Initiatives to improve profitability



**Double productivity**



November 28, 2019

# Strategy of Energy Business

Ichiro Ikeda  
General Manager  
Solar Energy Marketing Division,  
Corporate Solar Energy Group &  
Energy Business Strategy Division,  
Corporate Management Promotion Group  
KYOCERA Corporation

## **1 Business Background**

**40-year history of solar energy business**  
**Toward a sustainable society**

## **2 KYOCERA ENERGY VISION 3.0**

**New business development based on a shift**  
**from selling goods to selling services**

## **3 KYOCERA ENERGY ACTION 2020**

**“Enerezza” residential storage battery**  
**“ENE-FARM mini” fuel cell**



# Toward a Sustainable Society

## KYOCERA ENERGY VISION 3.0

京セラは、技術力でエネルギーを変える。



1975

Established Japan Solar Energy Corp. (JSEC)



1979

Made first shipment (to a microwave communications station in Peru)



1982

Started mass-production of multicrystalline silicon solar cells (world-first)



1983

Began contributing to rural electrification



1987

Achieved world's highest solar cell conversion efficiency



## Phase 1 Independent power supply

# 40-plus year history of solar energy business

1991

Produced Japan's first grid-connected solar electric system (Kitami, Hokkaido)



2007

Constructed large-scale solar power plant (13.8MW, Spain)



2013

Constructed Japan's largest solar power plant (70MW) \*As of November 1, 2013



2015

Launched floating solar power plant



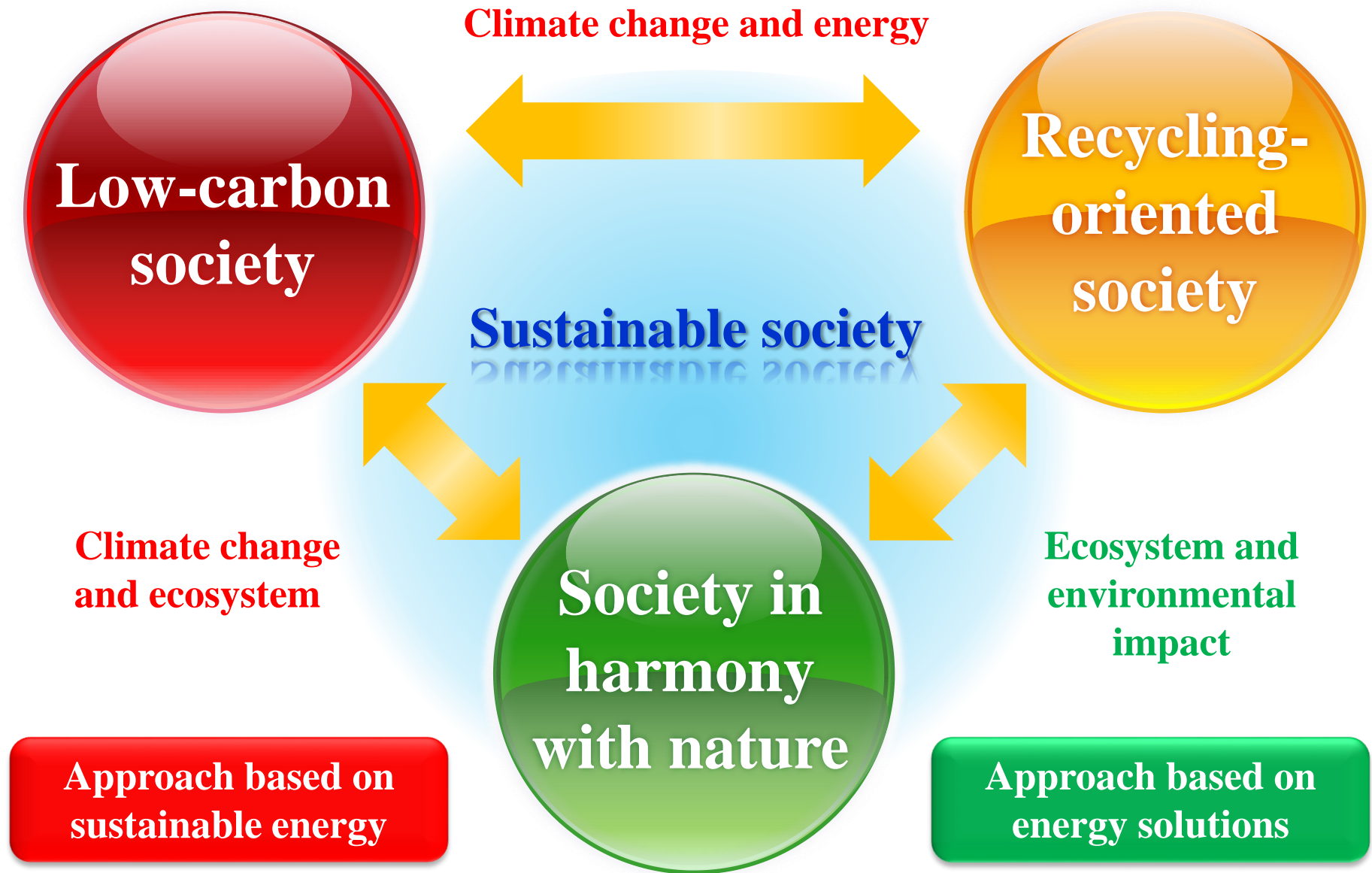
2019

**Power services business**

**“Vision 3.0”**

**Energy Service**

## Phase 2 Grid connection → Feed-in tariff (FIT) system



## What is a sustainable society?

**Realization of an economic system that  
grows and develops sustainably and  
is in harmony with the global ecosystem**

## Global Realize a low-carbon society

### COP21 – Paris Agreement (framework for climate change)



- Limit average global temperature increase to 2°C and aim for 1.5°C
- Realize zero greenhouse gas emissions in real terms globally by 2060-2080

### SDGs – 17 goals for sustainable development



### Reduce greenhouse gas emissions by companies/organizations

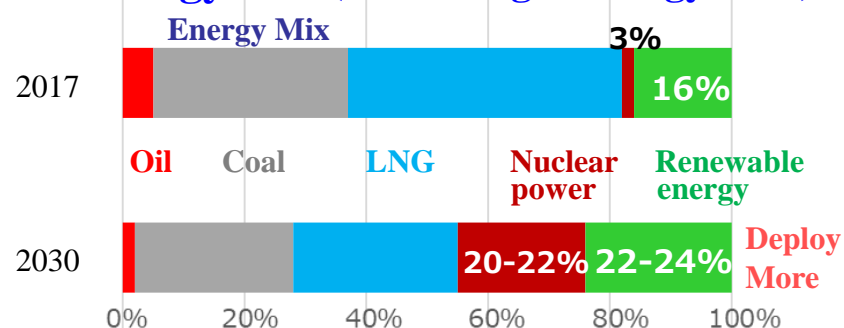


(Launched in 2014, currently 206 companies as members)

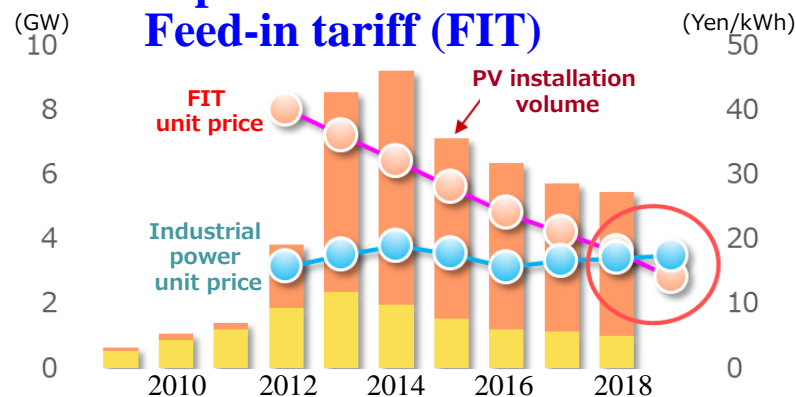


## Japan Shift to renewable energy as main power source

### 2030 energy mix (5<sup>th</sup> Strategic Energy Plan)



### Measure to promote introduction: Feed-in tariff (FIT)



- FIT unit price < Power unit price  
⇒ Shift to self consumption of PV power

• Increasing environmental awareness globally

• Promote introduction of renewable energy



• Limits to FIT system  
• Increased competitiveness for PV power



Shift to renewable energy (PV) power source  
Self-consumption (home/company)  
Local production for consumption (regional)

# Toward a Sustainable Society

## KYOCERA ENERGY VISION 3.0

**New business development  
based on a shift from selling goods to selling services**

京セラは、技術力でエネルギーを変える。



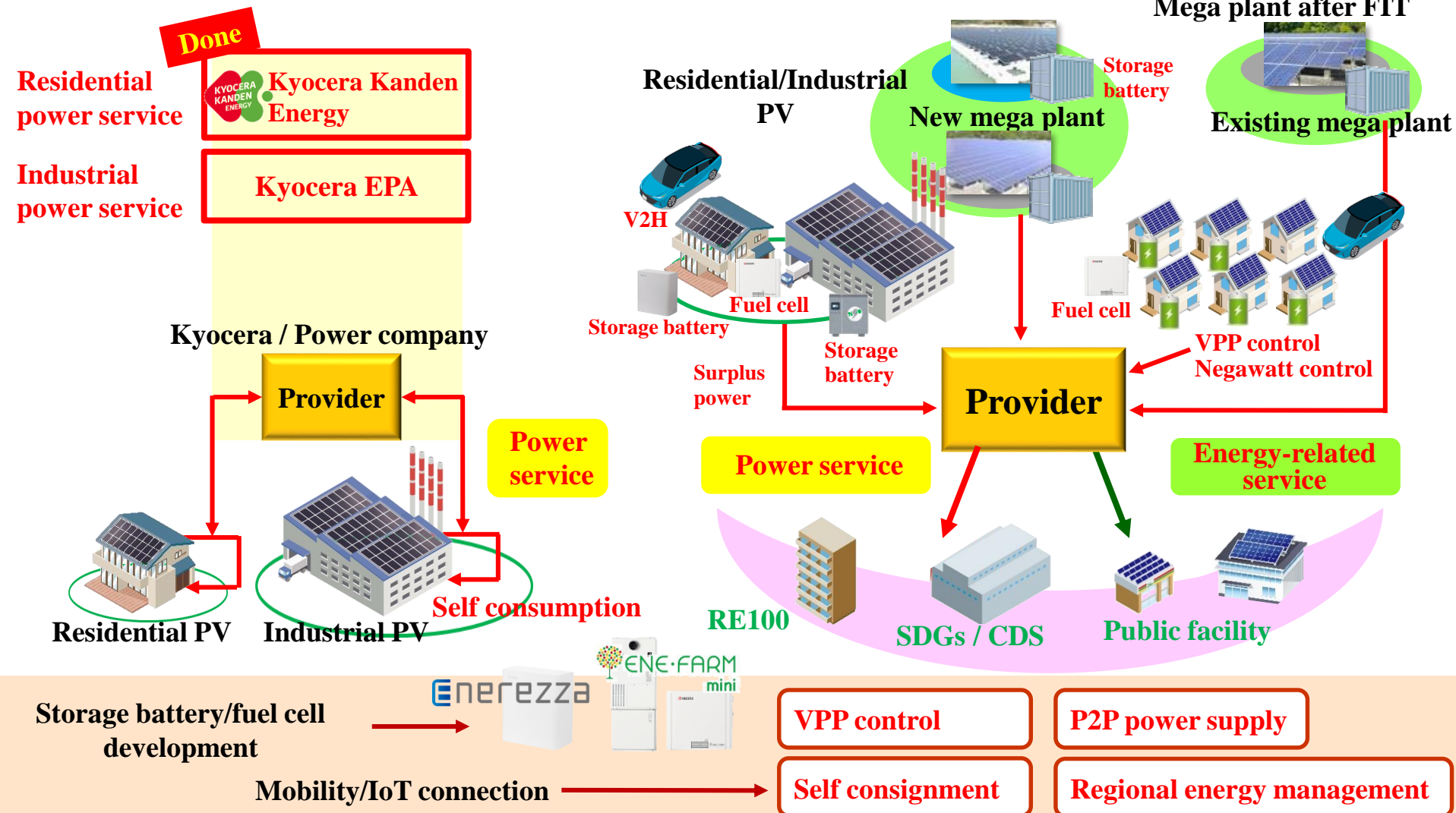


## Rooftop PV power supply (self-consumption)

## Regional energy optimization (local production for local consumption)

2033~

Mega plant after FIT





## Kyocera's features

**Long-term reliability/  
Long life**



**Long-term  
business operation**

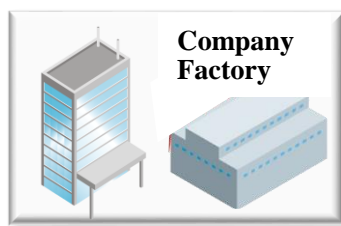
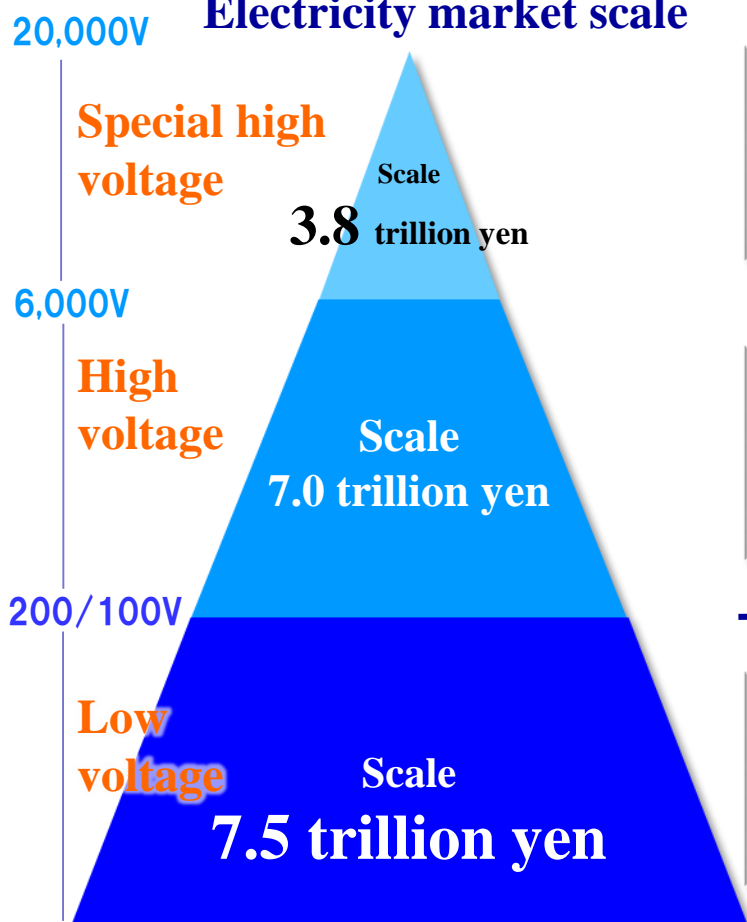


**Competitive service pricing**

**Rooftop PV power supply (self-consumption)**

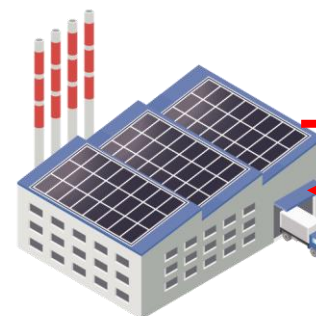
**Service started October 2019**

## Electricity market scale



Industry

**Kyocera EPA LLC.**



**Power service  
Self consumption**



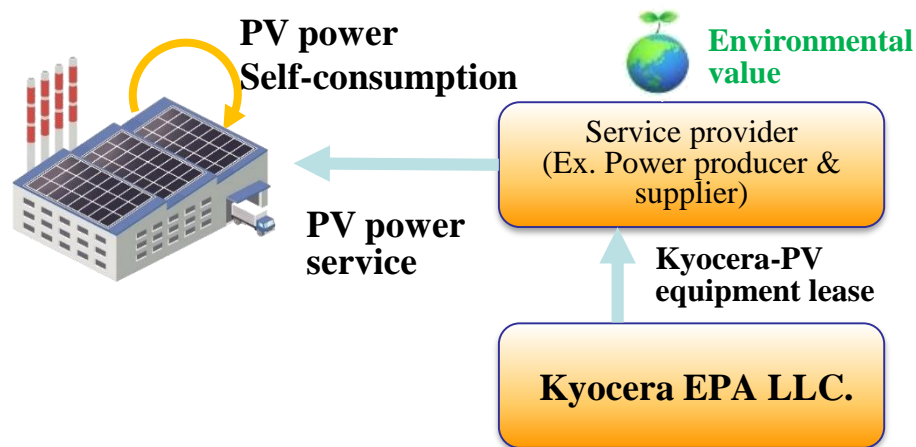
Residential

**Kyocera Kanden Energy LLC.**



**Power service  
Self consumption**

## Industry Kyocera EPA LLC.



Service in which the service provider charges according to the amount of PV power generated for the company

### Merits

**Company:** Install PV system at no initial cost

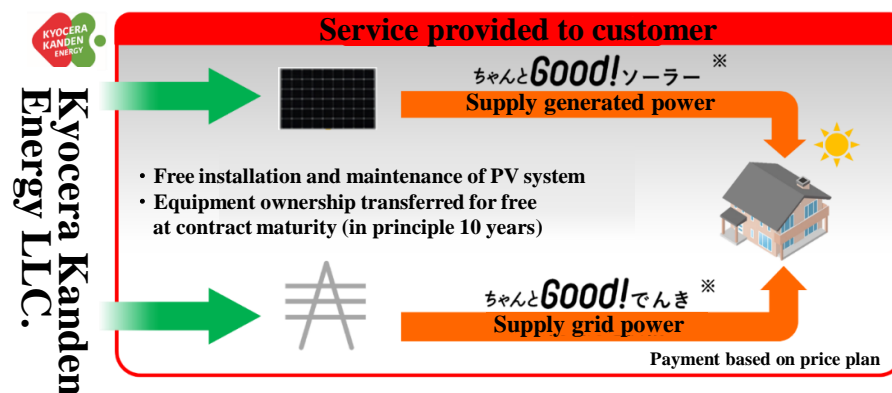
**Provider:** Long-term transaction with company

### Strengths

**Scheme built based on recognition of Kyocera's corporate appeal, reliability and product quality**

## Residential Kyocera Kanden Energy LLC.

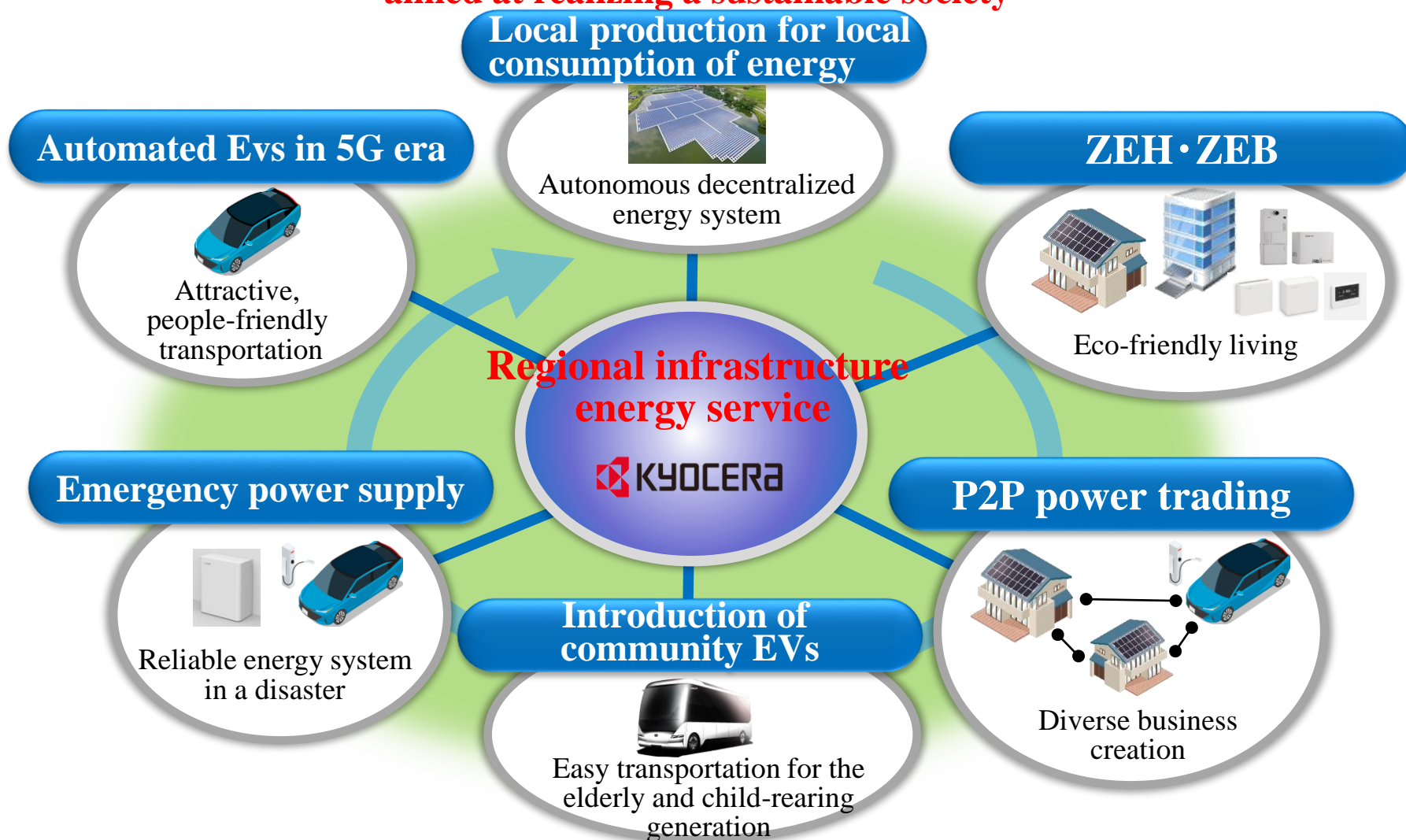
### Best choice system



Third-party ownership (TPO) model for PV supplied by Kyocera Kanden Energy LLC.

- (1) **Install PV system at no initial cost**  
Equipment ownership **transferred for free to customer** at contract maturity (10 years)
- (2) **Provide power charges that are attractive to customers**
- (3) **Can use power generated by PV system in case of blackout**

**Create an independent, decentralized society with a focus on renewable energy  
aimed at realizing a sustainable society**



# KYOCERA ENERGY ACTION 2020

**Value-added product for residential business**  
**“Enerezza” residential storage battery**

**Value-added product for condominiums and apartment buildings**  
**“ENE-FARM mini” fuel cell**

京セラは、技術力でエネルギーを変える。



## Standardization of energy-saving houses based on ZEH a precondition for 2030 energy mix

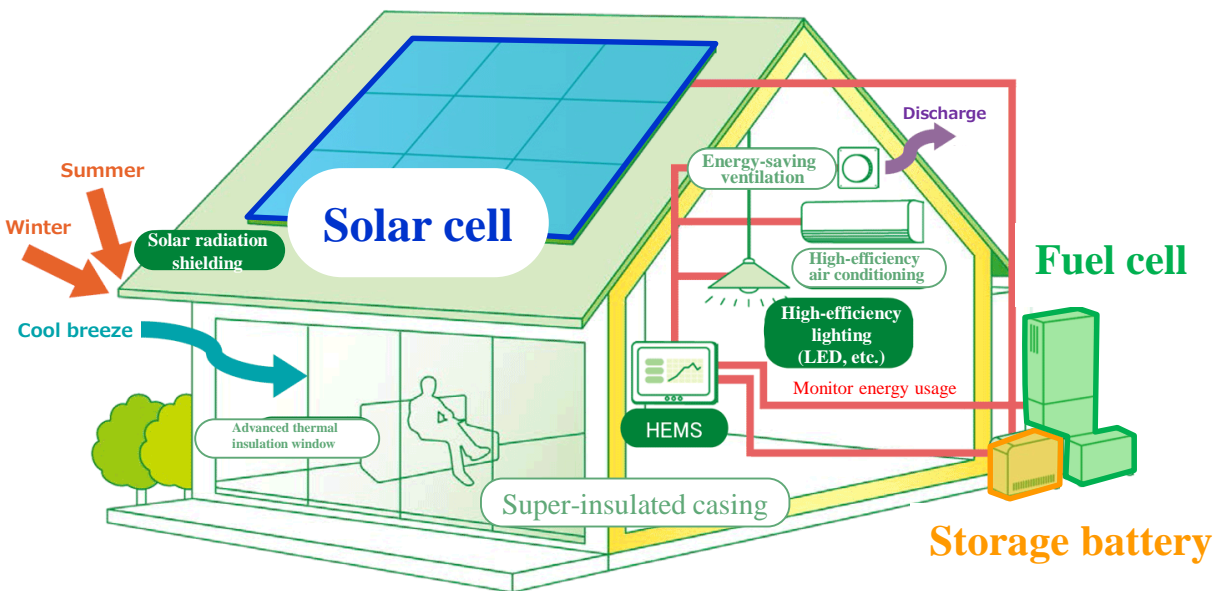
Future image of housing = Evolutionary model with integrated power supply/demand system

Solar cell : PV

Storage battery

Fuel cell

Charge surplus power generated by PV and fuel cell into storage battery



**Increased  
self-consumption**

**Alleviation of burden on  
power grid**

**More eco-friendly home  
(expanded use of PV power)**

\*Kyocera processing with reference to JPEA PV OUTLOOK 2050

## Standardization of energy-saving houses based on ZEH a precondition for 2030 energy mix

Future image of housing = Evolutionary model with integrated power supply/demand system

Solar cell : PV

Storage battery

Fuel cell

In an emergency (blackout)



**Resilience**  
(safety, security)

**Secure power both  
day and night**

**Day: PV + fuel cell power generation  
+ storage battery charge**

**Night: Fuel cell power generation  
+ storage battery discharge**

Standardization

◆ Shift to zero-energy house (ZEH)

◆ Surplus power used to balance grid supply/demand

◆ PV system connected to storage battery/EV

◆ More community resilience in a blackout

\*Kyocera processing with reference to JPEA PV OUTLOOK 2050



## World's first\* clay-type lithium-ion energy storage system

### New residential power storage system

Product name:

# Enerezza

Enerezza

System  
configuration:



GOOD  
DESIGN  
AWARD  
2019



Production  
plan:

	Pilot line	Mass production line
Production start	From January 2020	After October 2020
Location	Osaka Daito Office	Shiga Yasu Plant
Scale	Small quantity	Approx. 20,000 units/year

\*Kyocera research (As of October 2, 2019), for clay-type energy storage systems.



## Clay-type lithium-ion energy storage system

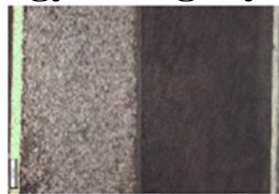
### Comparison with clay-type energy storage system

#### <Conventional energy storage system>

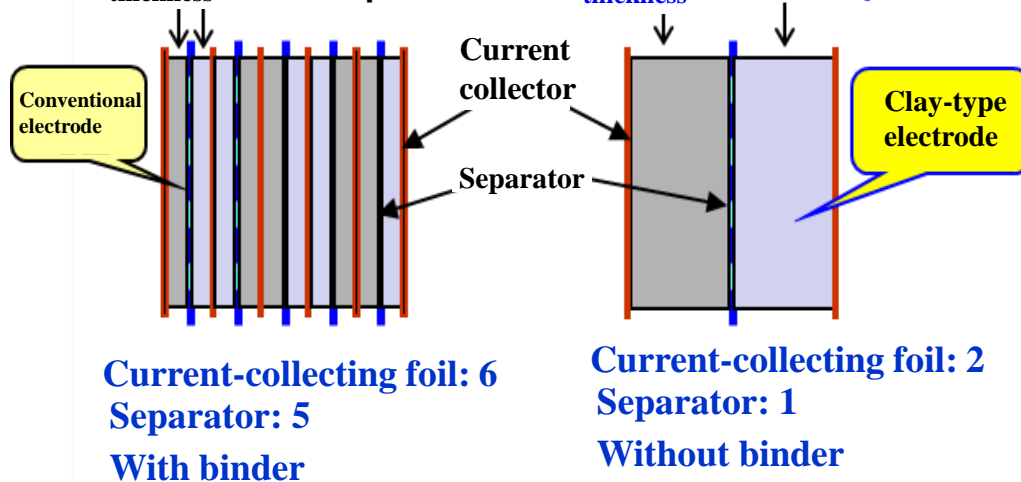


Electrode thickness : 50~120 $\mu$ m

#### <Clay-type energy storage system>



Electrode thickness : 300~400 $\mu$ m



 **Material costs  
Down approx. 30%**

### Features

#### (1) Advanced safety

- Clay-type electrode
- Unit cell structure
- Lithium iron phosphate used for positive electrode

#### (2) Long life

- Electrolyte design
- Designed specifically for residential use

#### (3) Low cost

- Material costs down 30%
- Minimal processing cost/capital investment

## Clay-type energy storage system's compatibility with PV system and independent operation in an emergency

Solar power generation



Existing PV system following **end of FIT**

Inverter



Enerezza Inverter



Mono-function power converter for storage battery

⇒ Can use existing PV system as is

Functionally linked with PV power converter

⇒ Maximize self-consumption in green mode

⇒ Reliable during prolonged blackout with independent operation of PV system

Continue to supply the necessary power in a blackout with its large capacity of up to 15kWh

Appliances that can be used (examples)



Fridge  
120W



TV  
65W



Mobile charging  
20W



LED light  
50W

Can use for up to  
**47** hours

continuously

at around 255W

※in case of 15kWh system



Rice cooker  
1,400W



Electric kettle  
1,200W

- Charging is possible using the independent operation functionality of the PV system
- Can secure continuous stable power supply without momentary stops even with weather fluctuations in the daytime
- Automatically starts to supply power to a specific load

If the total output is less than 2kVA, it is possible to cook rice or boil water even during a blackout. The anxiety of the meal at the time of blackout is also relieved.

# **“ENE-FARM mini” residential 400W SOFC system**

## **World’s smallest\* residential fuel cell**

Product name :

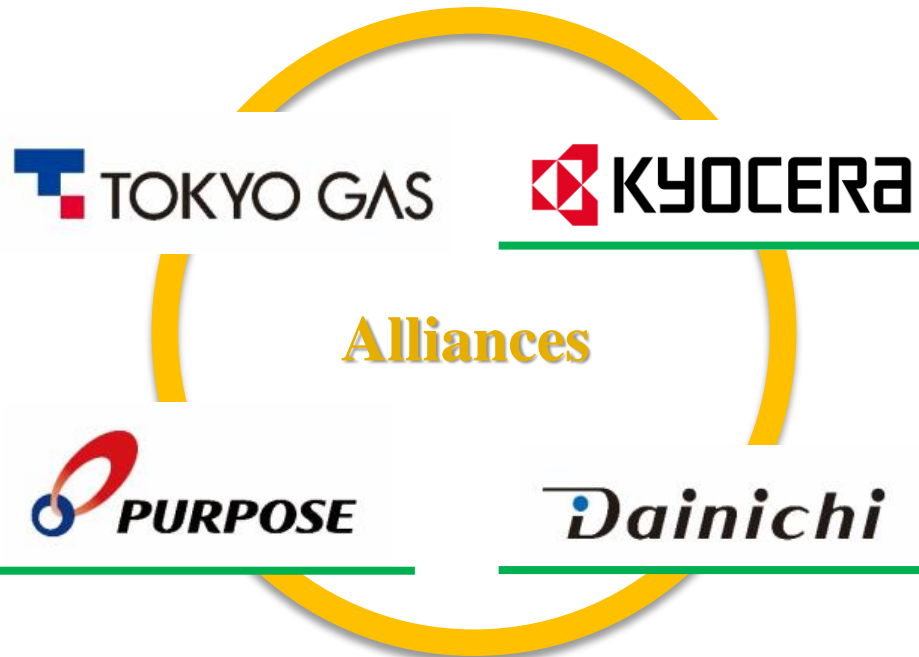


**Launched October 30**



\*In stationary fuel cell cogeneration systems for residential use (As of October 2019, Kyocera research)

## Sales, development and production system



\*Joint development between 3 companies

### ▶ Marketing / Sales

Tokyo Gas



### ▶ Cell stack / system development

Kyocera



### ▶ Fuel cell unit design / production

Dainichi Co., Ltd.



### ▶ Control of heat source equipment/ hot water in SOFC system

Purpose Co., Ltd.



## Product composition



**Thermoelectric  
generator**



**Fuel cell unit**



**Kitchen  
remote  
control**



**Bathroom  
remote  
control**

## Features

**(1) World's smallest size\*<sup>1</sup>**

**Can be installed in limited  
space/condominiums**

**(2) Advanced power  
generation performance**

**World-class power generation  
efficiency 47%\*<sup>2</sup>**

**(3) Eco- friendly**

**(4) Resilience**

\*<sup>1</sup> In stationary fuel cell cogeneration systems for residential use (As of October 2019, Kyocera research)

\*<sup>2</sup> At rated power generation, Lower Heating Value (LHV) standard; In stationary fuel cell cogeneration systems for residential use with rated output under 1kW (As of October 2019, Kyocera research)

## Eco-friendly

Power generation via  
**ENE-FARM mini**  
Primary energy use efficiency

80%

LNG tank



100%

Electricity 47%

Use of waste heat 33%

20%

Unusable waste heat

## Contributes to CO<sub>2</sub> reduction

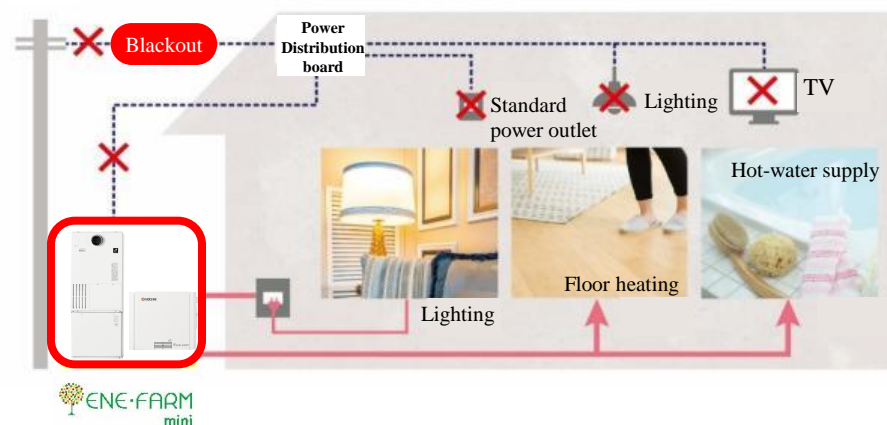


-1t  
(CO<sub>2</sub>/year)

## Resilience

Can use for heating and hot water\*

\*ENE-FARM mini will also stop when the gas supply stops.  
Hot water cannot be used when water is shut off.



Electricity is supplied from a dedicated power outlet during a blackout

Fill a hot bath

190W



Charge a smartphone or mobile phone

20W



LCD TV (32-inch)

65W



# **Toward a Sustainable Society**

## **“KYOCERA ENERGY VISION 3.0”**

**New business development based on a shift  
from selling goods to selling services**

## **“KYOCERA ENERGY ACTION 2020”**

**“Enerezza” residential storage battery**

**“ENE-FARM mini” fuel cell**

京セラは、技術力でエネルギーを変える。





November 28, 2019

# Strategy of Mobility Business

Yasuhiro Satake  
Senior Manager  
Mobility Business Strategy Department  
Mobility Business Strategy Division  
Corporate Management Promotion Group  
KYOCERA Corporation

# **1** Environment surrounding Mobility

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# **2** Kyocera's Mobility-related Businesses

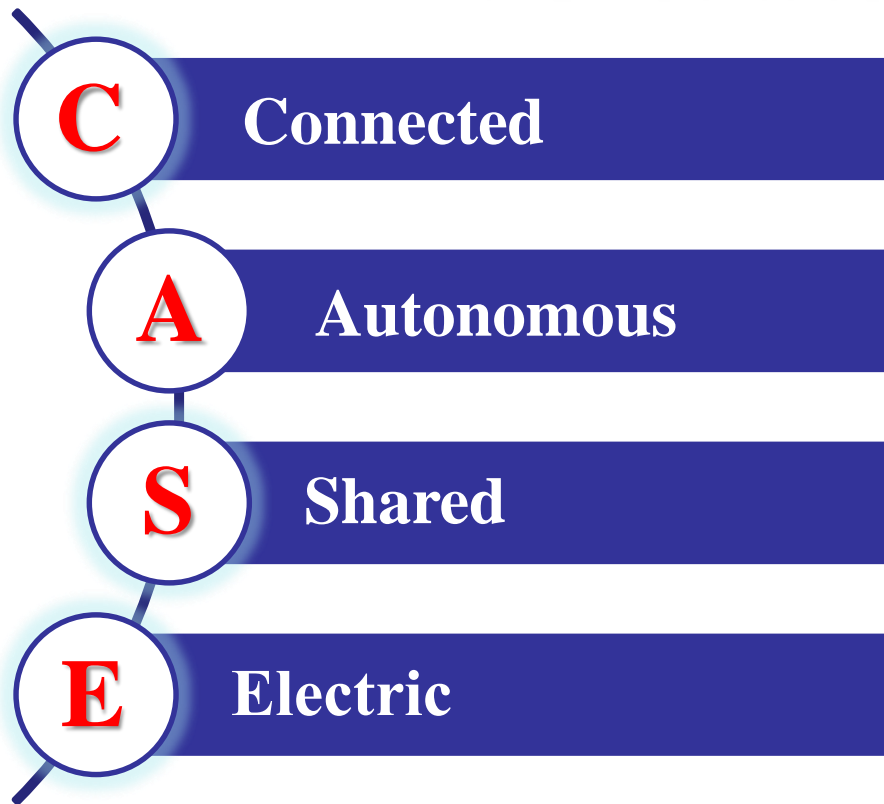
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# **3** Toward Resolution of Social Issues

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## Once-in-a-century Revolution in Automotive Industry

IN AUTOMOTIVE INDUSTRY



## Once every 20 years Revolution in Mobile Networks

1980~  
2000

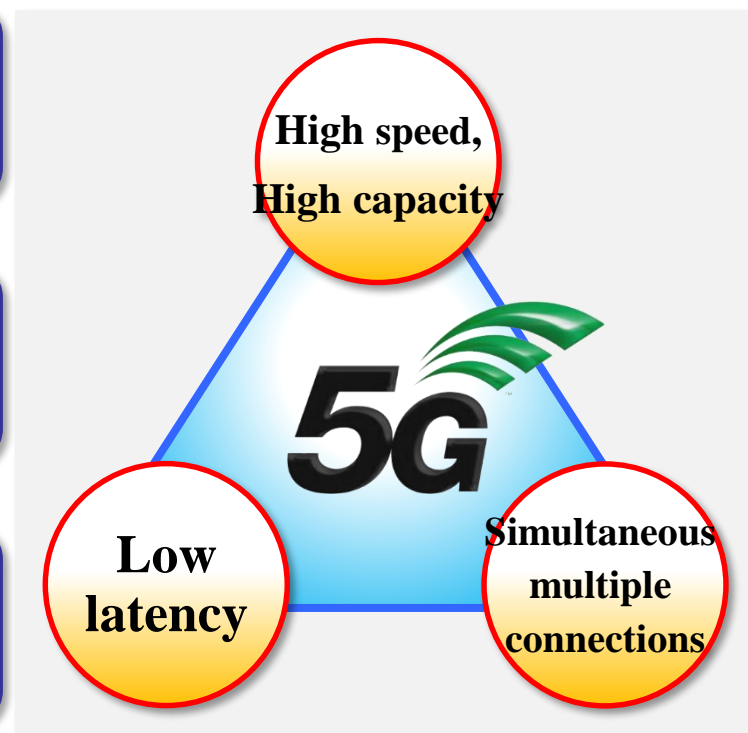
- Advent and proliferation of mobile phones
- Shift from 1G (Analog) to 2G (Digital)

2000~  
2020

- Spread of mobile internet and smartphones
- Shift from 3G (W-CDMA) to 4G (LTE)

2020~

- High reliability to resolve social issues
- 5G can also be used as a private network



**5G can be used to resolve social issues related to mobility**

## Toward a Sustainable Society, Everyone can move cleanly, freely and safely



### Chronic Traffic Congestion



Optimization of  
traffic using ICT\*

### Inadequate Public Transportation for Vulnerable Citizens



Transportation system  
ensuring freedom of  
movement

### Increase in Fatalities caused by Traffic Accidents



Securing a safe  
transportation system

**1** Environment surrounding Mobility

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**2** Kyocera's Mobility-related Businesses

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**3** Toward Resolution of Social Issues

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## Contributing to Environmental, Informational and Safety aspects of Automobiles

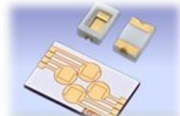
**Product lineup that contributes to energy conservation through improved fuel efficiency**



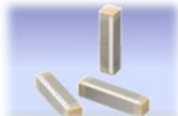
Glow plug



Power modules



LED package



Piezo stack

**Environment**

**Extensive lineup from telematics modules to display devices**



Telematics modules



Cluster LCD



HUD LCD



Mirror display

**Information**

**Safety**

**Wide range of products such as surround view cameras, millimeter-wave substrates**

**Under development**



Camera modules



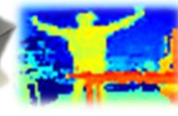
Millimeter-wave substrate



**Stereo camera**



**Camera - LiDAR**

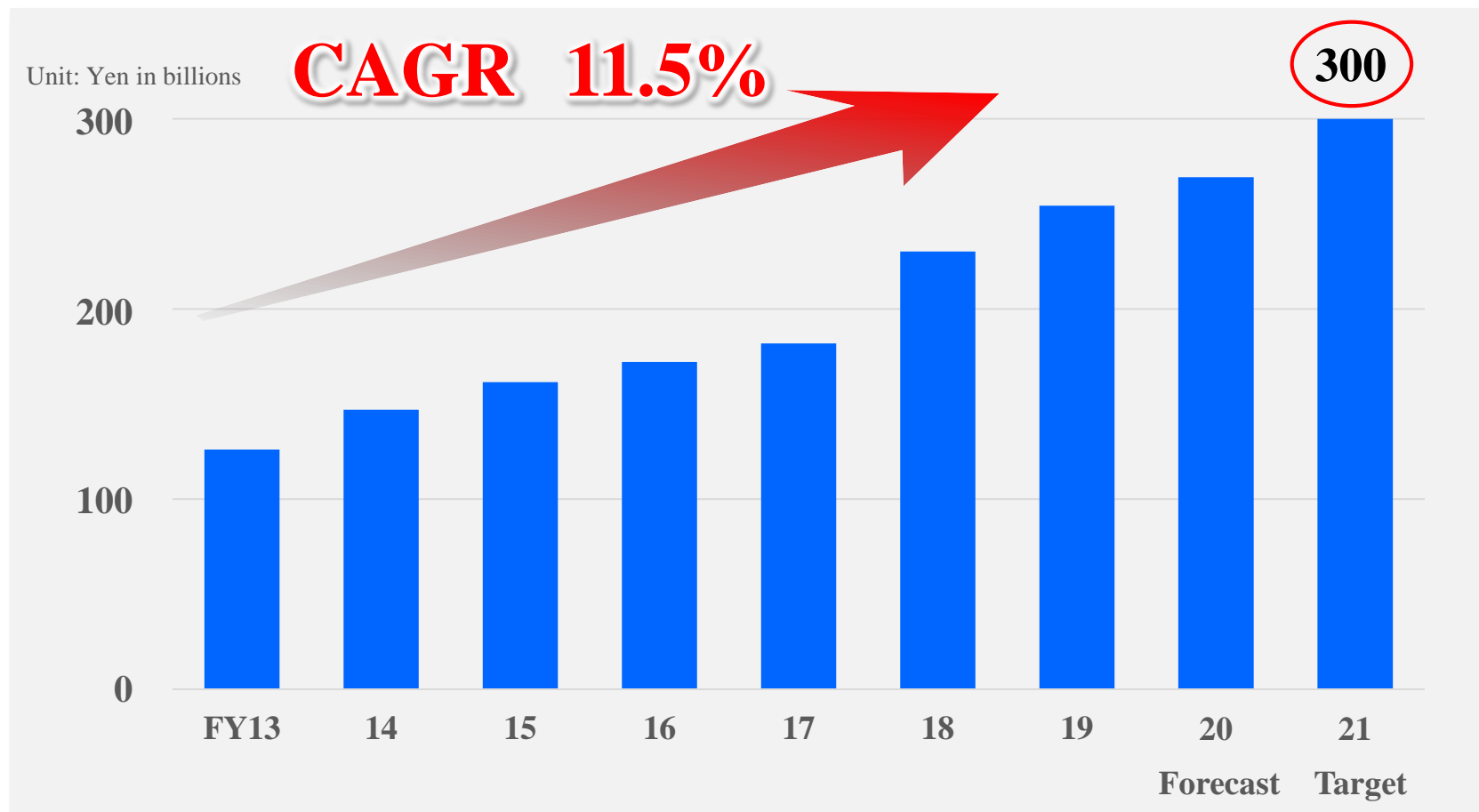


**FIR camera**

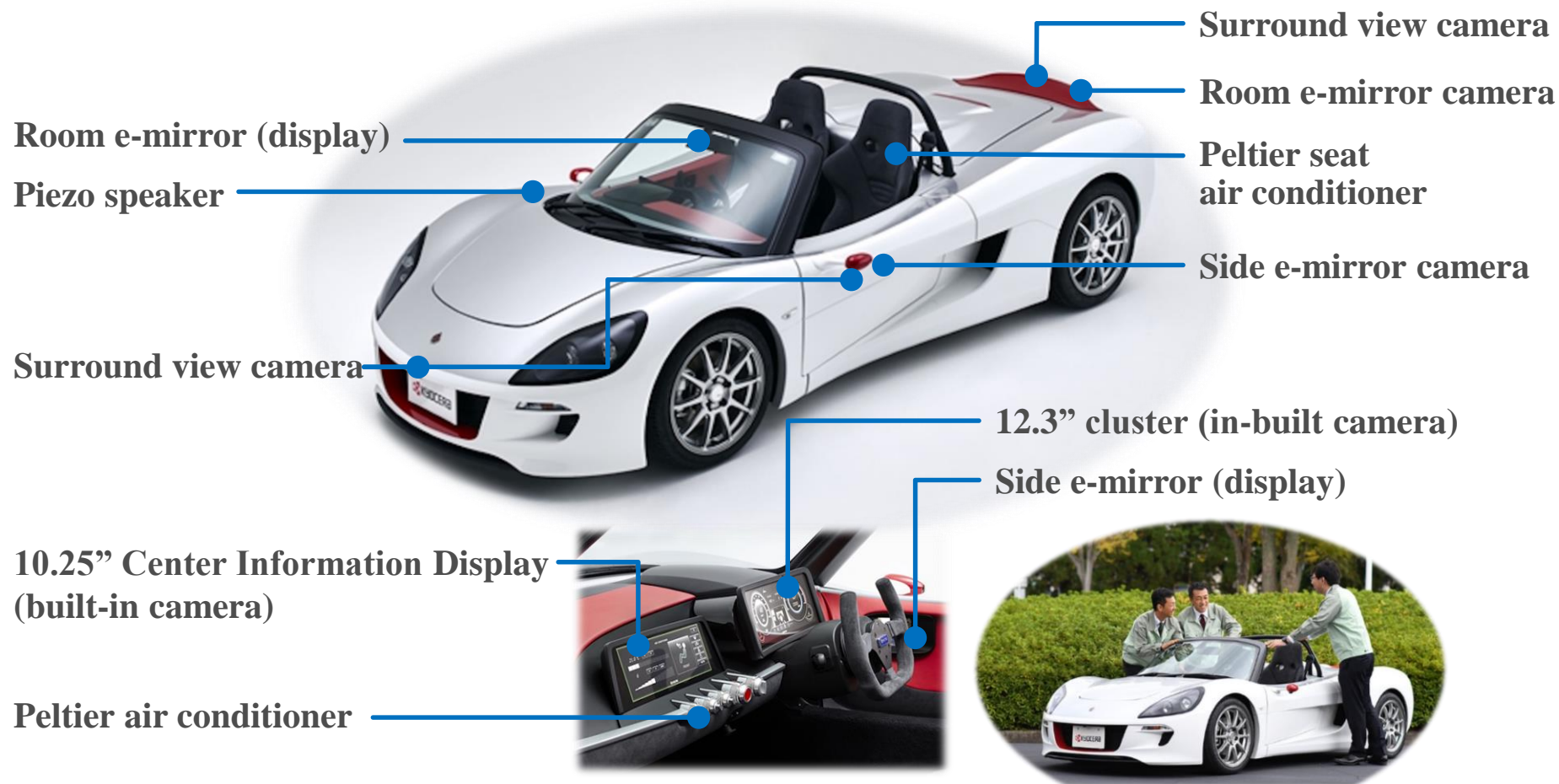




## Steady Growth aiming for 300 billion yen



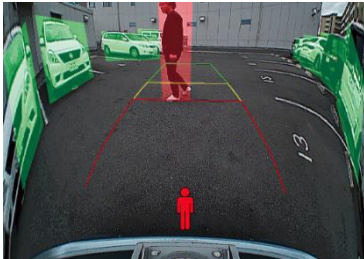
## Advanced Devices installed in Tommykaira (GLM)



**Exhibited at Automotive Engineering Exposition Yokohama 2018 and CEATEC 2018**

## AI recognition camera

- AI is built into automotive cameras to realize advanced recognition



Object detection



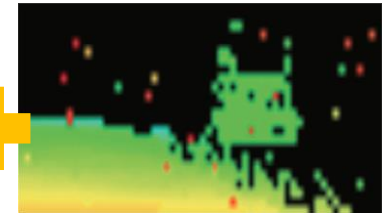
Free-space detection

## Camera-LiDAR

- Uniform optical axis between camera and LIDAR through unique optical system
- Realizes fusion sensing



Camera image



LiDAR image

## FIR camera

- Stable object recognition not affected by light source



CMOS camera image



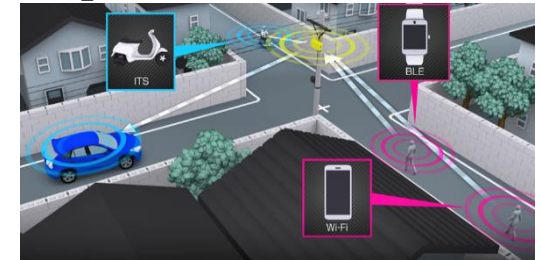
FIR camera image

## V2I Roadside unit

- Enables communication with various devices through stable wireless communication and supporting multi-protocol



Roadside unit



Reduces accidents through cooperative control

**Exhibited at CEATEC 2019**

**1** Environment surrounding Mobility

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**2** Kyocera's Mobility-related Businesses

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**3** Toward Resolution of Social Issues

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## Major Social Issue of Maintaining Local Public Transport

**Depopulation**

**Aging  
population**

**Driver  
shortage**

**Natural  
disasters**

- **Railway lines were damaged by the Great East Japan Earthquake**
- **Railroads were paved over and converted into roads for use with a Bus Rapid Transit (BRT) system**
- **Introducing Autonomous Driving Technology is essential to maintain Public Transport in depopulated areas**

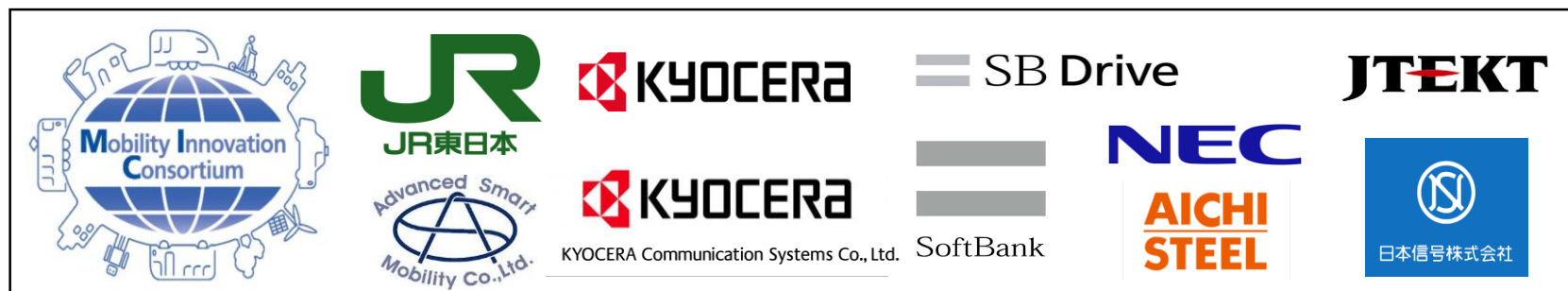


**BRT: Bus Rapid Transit**



## Promoting a Demonstration Experiment through Open Innovation

Autonomous Driving Technology has been tested by Mobility Innovation Consortium



### FY2019 Demonstration Test



Autonomous Driving Bus



Roadside unit



JR East "Ofunato line"



## Autonomous BUS Driving Technology Test for BRT Line

Press release on November 8, 2019

Support Autonomous Driving with Kyocera's Wireless network and Sensing technology

**Experiment on more closely  
actual operation with  
a large autonomous bus**



- **Automation Level 2 equivalent**  
**Final target : Level 4**  
(wireless control)
- **Maximum speed: 60km/h**  
(assumed speed in actual operation)
- **Line length: 4.8km**  
(assumed area in actual operation)

**Control over wireless NW,  
Obstacle detection using  
millimeter-wave technology**

**iITS**  
CONNECT

**lte**  
Advanced  
Pro



**Roadside unit**



**Create a private wireless  
network using multi-hop  
technology**



**Kesennuma BRT**

## Increase in Traffic Accidents involving Vulnerable Citizens

Decreasing birthrate,  
Aging population

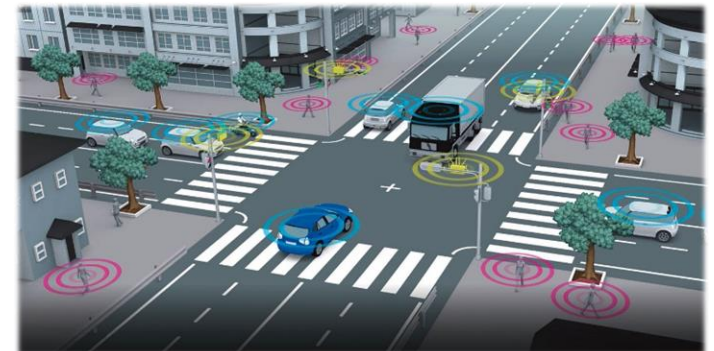
Elderly operating error

Kids leaping out

Intersection without traffic signals



- Limited with only Autonomous control via In-vehicle sensors
- Essential to have a Cooperative infrastructure system that also uses Unforeseen information
- Need to install Smart Roadside units to enable Cooperative control using Signal and Dynamic information



Cooperative control at an intersection with traffic signals





## Contributing to the Resolution of Social Issues related to Mobility

20C18T 1220G2 LG18160 10 1A10D11C1



AI recognition camera



FIR Camera



Camera-LIDAR



Telematics module

**ADAS**

Automotive devices

**Cooperative  
Autonomous  
Driving**



**Actual proof using  
Autonomous BRT driving**

Roadside unit

(sensing, wireless communication,  
private network)

**Roadside unit used  
as Service Platform**



**Utilizing 5G**

Systems and Solutions

## Cautionary Statements with respect to Forward-Looking Statements

Certain of the statements made in this document are forward-looking statements, which are based on our current assumptions and beliefs in light of the information currently available to us. These forward-looking statements involve known and unknown risks, uncertainties and other factors. Such risks, uncertainties and other factors include, but are not limited to the following:

- (1) General conditions in the Japanese or global economy;
- (2) Unexpected changes in economic, political and legal conditions in countries where we operate;
- (3) Various export risks which may affect the significant percentage of our revenues derived from overseas sales;
- (4) The effect of foreign exchange fluctuations on our results of operations;
- (5) Intense competitive pressures to which our products are subject;
- (6) Fluctuations in the price and ability of suppliers to provide the required quantity of raw materials for use in our production activities;
- (7) Manufacturing delays or defects resulting from outsourcing or internal manufacturing processes;
- (8) Shortages and rising costs of electricity affecting our production and sales activities;
- (9) The possibility that future initiatives and in-process research and development may not produce the desired results;
- (10) Companies or assets acquired by us not produce the returns or benefits, or bring in business opportunities;
- (11) Inability to secure skilled employees, particularly engineering and technical personnel;
- (12) Damages on our information security systems from cyberattacks, etc. and significant costs in order to recover and maintain the systems;
- (13) Insufficient protection of our trade secrets and intellectual property rights including patents;
- (14) Expenses associated with licenses we require to continue to manufacture and sell products;
- (15) Environmental liability and compliance obligations by tightening of environmental laws and regulations;
- (16) Unintentional conflict with laws and regulations or newly enacted laws and regulations;
- (17) Our market or supply chains being affected by terrorism, plague, wars or similar events;
- (18) Earthquakes and other natural disasters affecting our headquarters and major facilities as well as our suppliers and customers;
- (19) Credit risk on trade receivables;
- (20) Fluctuations in the value of financial instruments held by us;
- (21) Impairment losses on property, plant and equipment, goodwill and intangible assets;
- (22) Uncertainty over income tax and deferred tax assets; and
- (23) Changes in accounting principles.

Due to such risks, uncertainties and other factors, our actual results, performance, achievements or financial condition may be substantially different from any future results, performance, achievements or financial condition expressed or implied by these forward-looking statements. We undertake no obligation to publicly update any forward-looking statements included in this document.