



JICA Clean City Initiative (JCCI) Seminar

Introduction to HORIBA Applications

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HORIBA, Ltd.

International Sales Department

2022/1/19

Agenda

1. Corporate Profile

2. Monitoring Products (Air / Stack Gas / Water)

3. Appendix

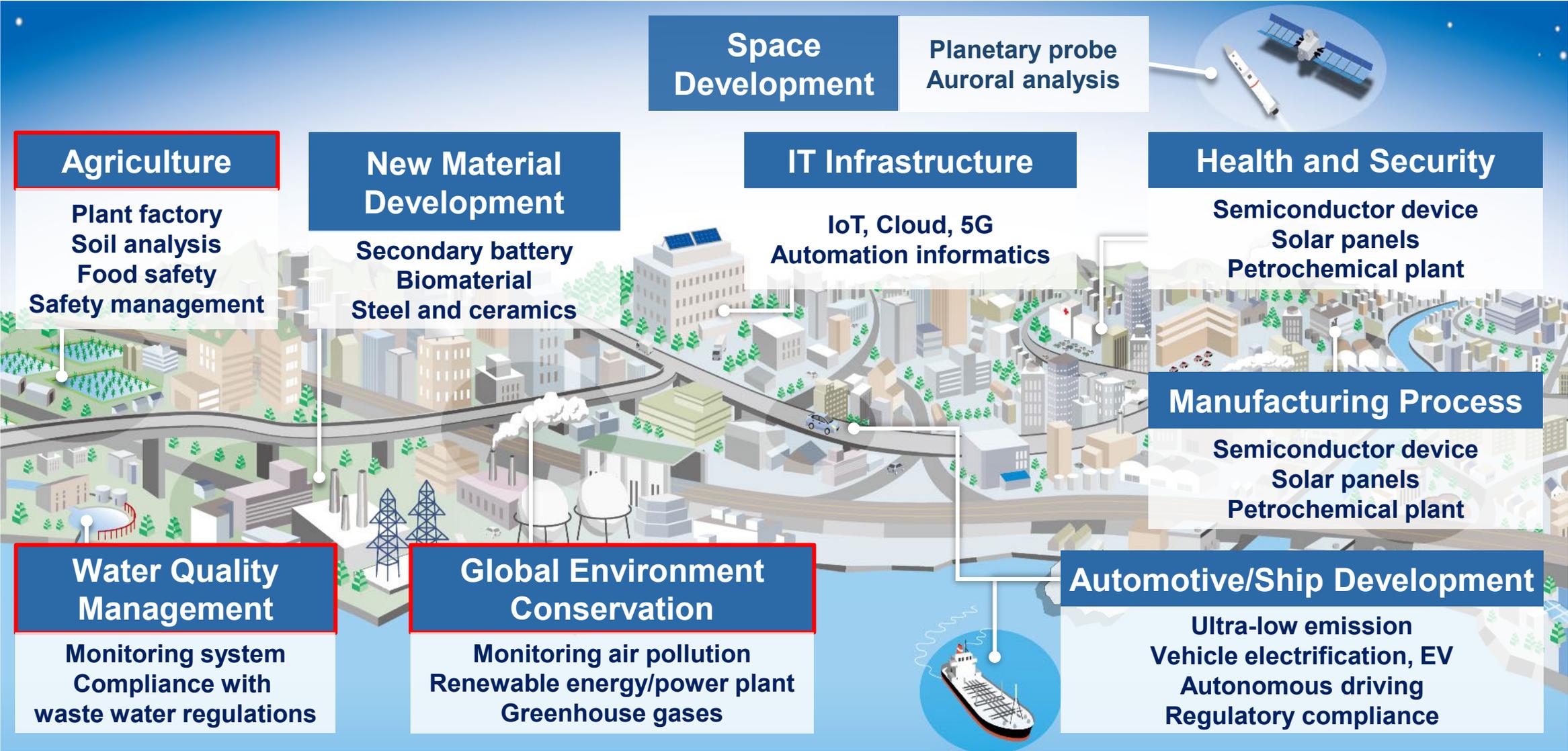
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HORIBA's Business Domain



Application of Basic Technologies

Gas Flow Control



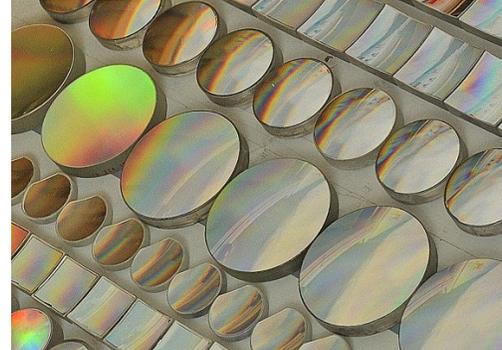
Automotive
Process & Environmental
Semiconductor

Infrared Measurement



Automotive
Process & Environmental

Spectroscopic Analysis



Scientific
Semiconductor

Particle-size Distribution Analysis



Automotive
Medical
Scientific

Electrochemistry



Process & Environmental
Semiconductor
Medical
Scientific

HORIBA allocates its development resources by focusing on specific analytical and measurement technologies, through the applied development of these technologies, efficiently conducts product development in 5 business segments with different markets.

~HORIBA's Global Activities and Contribution~

Morocco
 ● JICA Business Verification Survey for monitoring air quality (PM2.5)



Pakistan
 ● Technical Cooperation for Establishment of Environmental Monitoring System



Myanmar
 ● Dyeing Wastewater Treatment Pilot Plant for Myanmar Traditional Clothes "Longyi"
 Pilot Projects for Water Environment Improvement in Asia / Ministry of the Environment, Japan



● The Yangon City Sewage Treatment Plant Management and Maintenance Capacity Building Improvement Project

Mexico
 Pocket meters for agriculture industry in Mexico. It helps to monitor nutrients concentration and keep healthy growing of plants.



Nigeria
 ● Nanoparticle Analyzer (SZ-100) for pharmaceutical laboratory (ODA project)



Brazil
 ● River / Sea surface water quality monitoring
 ● Research purpose about environmental impact due to hydro power plant buildings



South Africa
 ● Raw Water Quality Monitoring of Desalination & Reuse Demonstration Plant



Laos
 ● Automotive Emission Analyzer for a project to strengthen engineering human resources for industrial development



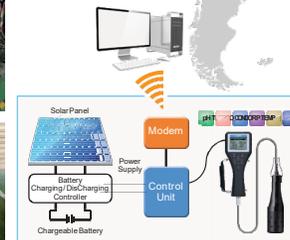
Indonesia
 ● Feasibility Study for Innovation of Remote Operation, Low Maintenance Type Water Quality Monitoring System (For Tanahashi Electric Machinery Co., Ltd.)



Vietnam
 ● Bac Ninh Province Surface Water Quality Monitoring Station (12 Stations)
 ● Phong Khue Waste Water Monitoring Station



Cambodia
 ● The Project for Expansion of National Maternal and Child Health Center



Air Quality Monitoring **Water Quality Monitoring**

R&D **Mobility** **Blood Analysis**

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Air Quality Monitoring System (AQMS)

Fixed Station



Integrated to
19 inch rack system

Mobile Station



Easy Operation and Maintenance

Example of Air Quality Monitoring Network

Ambient Monitor

- NO/NO₂/NO_x, SO₂, CO, O₃, CO₂, PM (10, 2.5, 1.0 etc.)



Meteorological Monitor

- Temperature
- Relative humidity
- Precipitation
- Ambient pressure
- Wind direction
- Wind speed



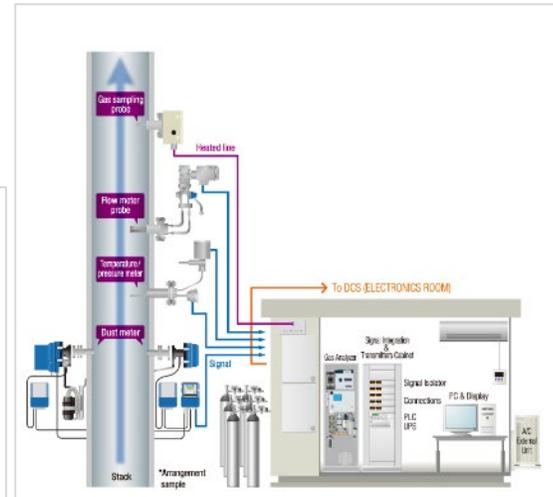
Stack Gas

Target Industries & Applications

- Electric Power Generation Plant
- Steam Boilers
- Glass Furnaces
- Petroleum Refinery

Major Products

- Stack Gas Analyzer
- Ambient Dust Monitor
- Tunable Laser Gas Analyzer
- Continuous Emission Monitoring System (CEMS)



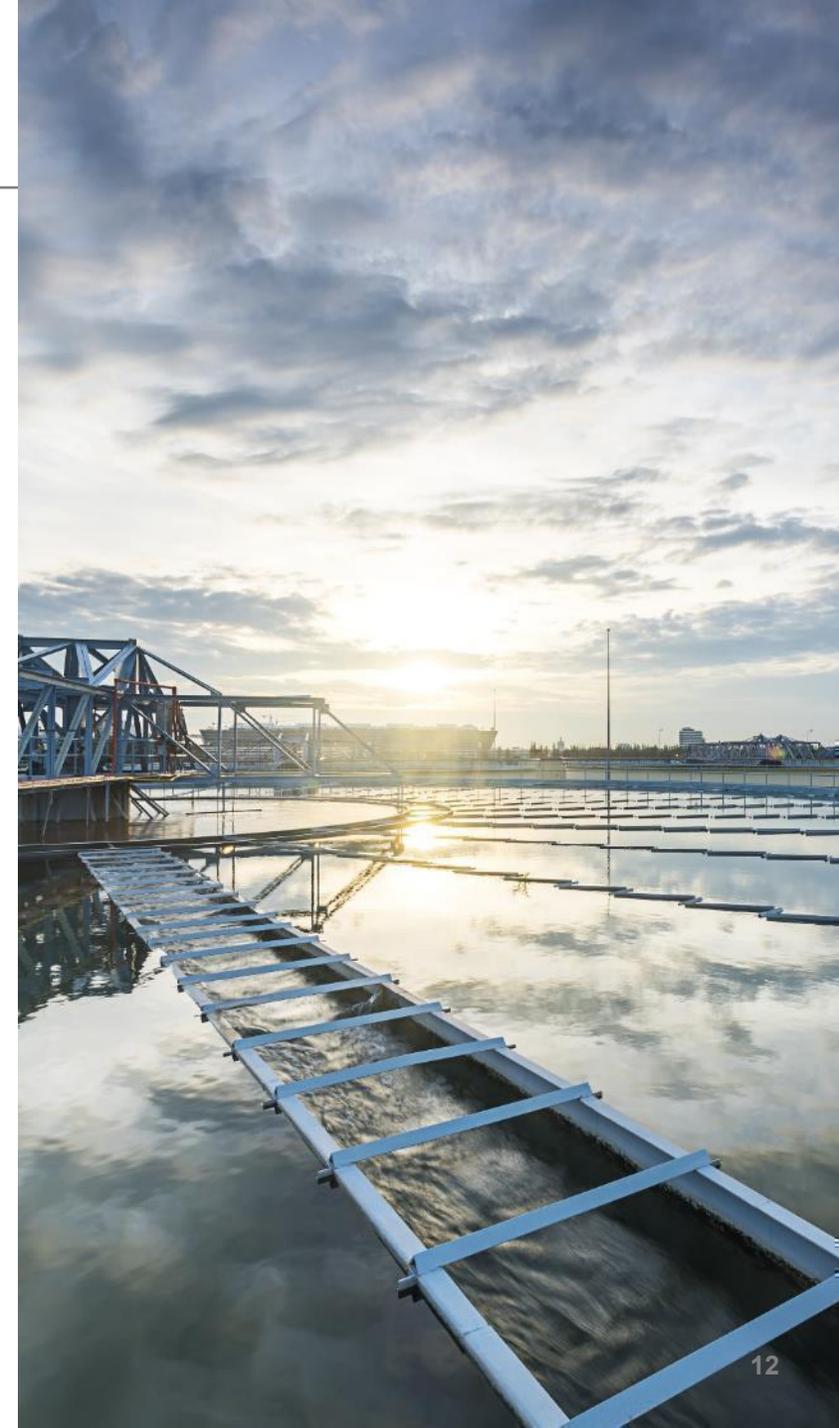
Water Treatment

Target Industries & Applications

- Water supply/Wastewater treatment
- Power plant
- Municipalities and various industries

Major Products

- Online-type Industrial Water Quality Meter
- Automatic Total Nitrogen/Phosphorus Monitor
- Organic Pollutant Monitor
- Water Distribution Monitor
- Water Quality Monitoring System (WQMS)



Monitoring related to Factories / Plants

Air Quality Monitoring System (AQMS)

- TSP
- SO₂
- O₃
- Heavy Metal
- PM₁₀
- NO_x
- H₂S
- Weather Parameter
- PM_{2.5}
- CO
- NH₃
- THC
- NMHC
- Wind Speed
- Direction

ENDA-9000

- NO_x
- SO₂
- CO
- O₂

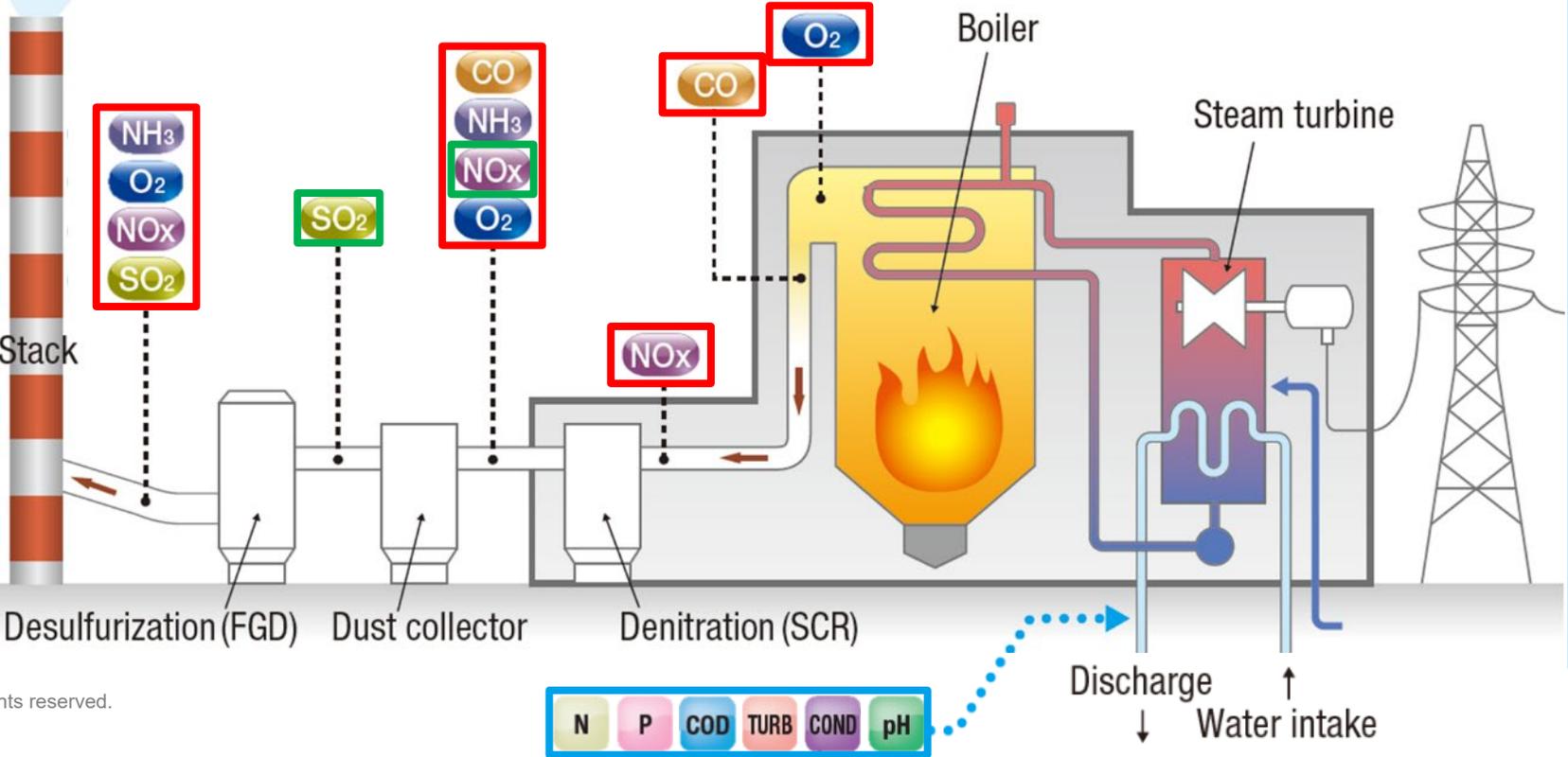
ENDA-C9000

- NH₃
- NO_x
- O₂

ENDA-5000

- NO_x
- SO₂
- CO

Water Quality Monitoring System (WQMS)



H-1

- pH
- COND
- TURB

CODA

- COD

Others

- P
- N
- etc.

Importance of Continuous Monitoring

On-site Monitoring

Lab Analysis

Use Analyzed Data to
Establish Regulations

Clean
Environment



Every country has their own Federal Reference Method (FRM).
On-site Monitoring can support this with the help of Lab Analysis.

Contact Information

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Omoshiro-okashiku
Joy and Fun



THANK YOU

Terima kasih
谢谢
Gracias
Σας ευχαριστώ πάρα πολύ
धन्यवाद
شُكْرًا
Danke
Tack ska du ha
Grazie
ขอบคุณครับ
Обольшое спасибо
ありがとうございました
Dziękuję
Cảm ơn
Merci
감사합니다

Agenda

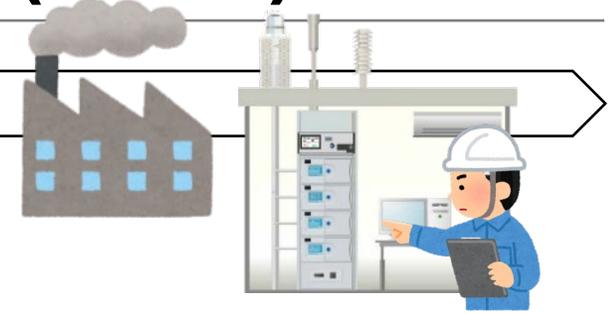
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Importance of Operation & Maintenance (O&M)

On-site Monitoring



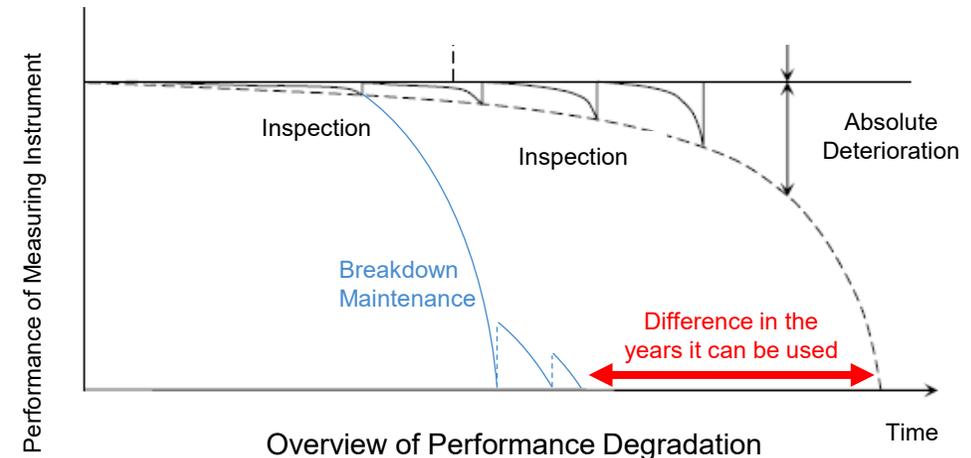
What are the contents of O&M?

- Calibration and Replacement of Consumables / Spare Parts
 - Purchase calibration gas & calibrate once a week using
 - Purchase and replace consumables / spare parts (Monthly / Semi-annually / Annually etc.)



【Performance Degradation】

- Important to carry out regular maintenance and not repairing after breakdown
→ There will be a difference in the number of years that it can be used



Food and Pharmaceuticals

Target Industries & Applications

- Pharmaceutical
- Food manufacturing
- Beverage manufacturing

Major Products

- Online TOC Monitor
- Hydrogen Fluoride Monitor
- Electric Conductivity Meter, Sanitary Sensor
- Rapid Microbial Detection System



Laboratory & Field

Target Industries & Applications

- Universities/Research institutes
- Quality Assurance, R&D in manufacturing
- Agriculture/Aquaculture

Major Products

- Benchtop Type Water Quality Meter
- Handheld Type Water Quality Meter
- Multi-parameter Water Quality Checker
- Oil Content Analyzer



Plastic Waste

Everything begins with HORIBA's measurement / inspection



Problems in Plastic Waste

Plastic waste including Microplastics (MPs) is small bits of plastic and either engineered for end-products, or the result of environmental degradation of polymer-based trash.

What are MPs?

MPs are classified into Primary and Secondary MPs. Primary MPs are directly released into the environment as small plastic particles. These are intentionally engineered particles, like those found in some consumer and industrial products. Cosmetics have used MPs as abrasives. Secondary MPs are the result of the degradation of large plastic waste, like plastic bags and bottles, into smaller plastic fragments when exposed to our environment. But these particles often weather, degrade or abrade from environmental or physical events, ending up in our oceans and elsewhere.

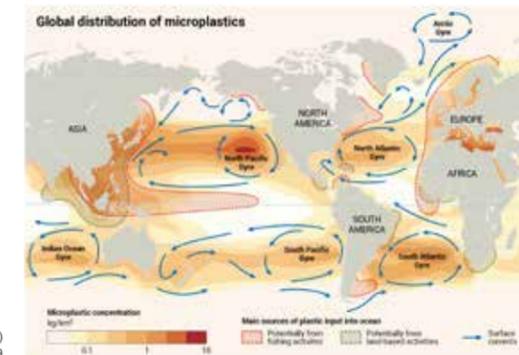
Where are MPs coming from?



Why are MPs a concern?

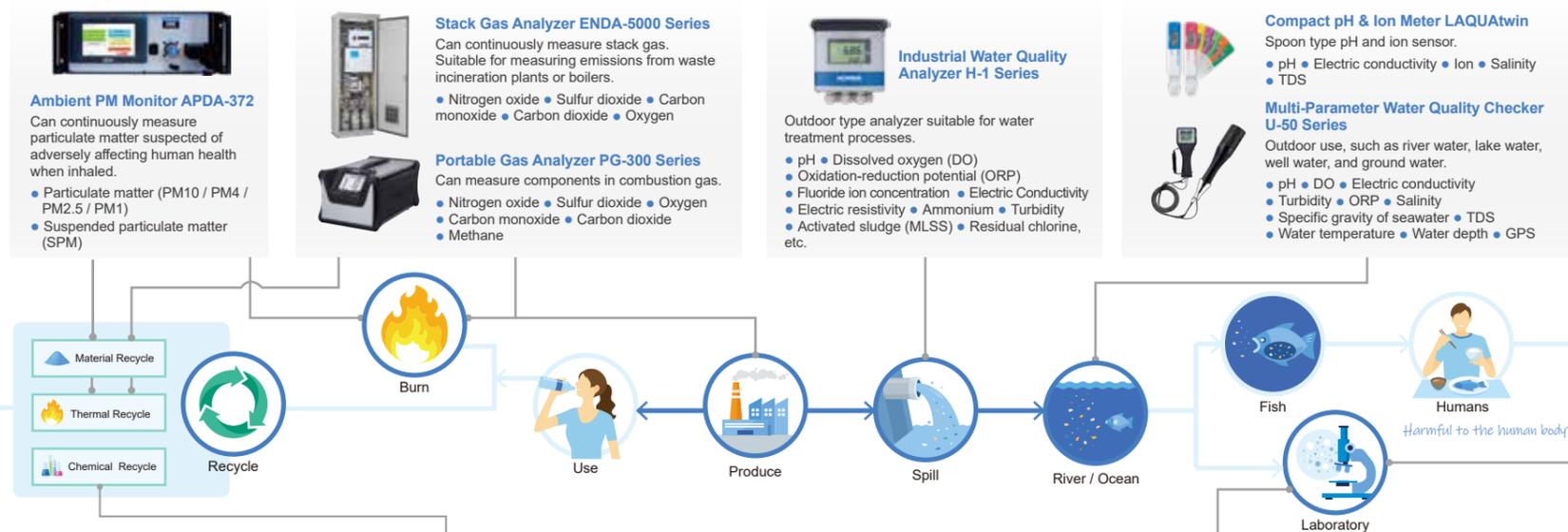
MPs can absorb and be an aggregation center for substances dissolved in water due to their higher chemical affinity with respect to water (higher hydrophobicity), increasing their load and potential toxicity. MPs have been found in a huge number of species among all groups of wildlife and in several types of food. The consumption of these foods can transfer MPs and their additives into the human body.

Considering this, it is crucial to focus on the analytical techniques which allow the identification and characterization of the smallest particles.



Cartographer: Riccardo Pravettoni and Philippe Rekaewicz (2019)
<https://grid-arendal.herokuapp.com/resources/13339>

Plastics flows in the environment & related HORIBA solutions



Explosion-Proof Process Gas Analyzer EIA-51 Series

Can continuously measure combustible gases or gases in an explosive environment. It covers a wide range of applications including infrared gas analyzers for general-purposes and models for use with oxygen and hydrogen.

- Carbon monoxide • Carbon dioxide • Methane • Hydrogen • Oxygen • Ammonia, etc.

Why EIA-51 Series? 1. Guarantee product quality 2. Hydrogen explosion proof

HORIBA Solution in the process of chemical recycling

Particle Tracking Analysis System ViewSizer 3000

Enables particle size analysis and particle number concentration measurement.

- Particle size: 10 nm - 15 µm
- Particle number concentration: 5 x 10⁶ - 2 x 10⁸

Laser Scattering Particle Size Distribution Analyzer Partica Series

Enables particle size distribution analysis with wide dynamic range. The Imaging Unit Accessory enables real-time particle observation.

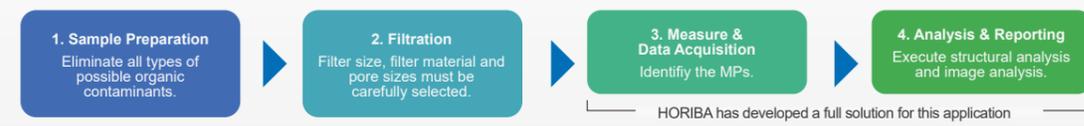
- Particle size: 10 nm - 5,000 µm

Fluorescence and Absorbance Spectrometer Duetta

For water analysis. Simultaneously combines the fluorescence and absorbance analyses.

- Fluorescence: 250 - 1,100 nm
- Absorbance: 250 - 1,100 nm

MPs can be toxic depending on its composition and also act as a carrier of other bacterial molecules that cling to it. Scientists fear the cumulative buildup of these toxins may affect the health of living organisms. Research through particle analysis and Raman spectroscopy in the steps below has begun to identify various MPs types in order to trace these particles back to its sources.



Raman Spectroscopy for Microplastic Analysis

After considering the optimal MPs analysis workflow and the needs and challenges, we can provide a full solution for this application with Raman spectroscopy.

- High resolution optical camera
- Raman spectrometer with 3 wavelengths (laser): Electric switching (532 nm, 638 nm, 785 nm laser)
- High precision automatic sample XYZ stage: XY motorized stage (X = 75 mm, Y = 50 mm)
- Optical microscope

ParticleFinder™: Most suitable Raman software option for MPs analysis

ParticleFinder™ is a fully automated software for Raman data manipulation and results. With ParticleFinder, particles can quickly be located on a video image, analyzed for size and shape descriptors, and then chemically characterized.



Additional software options:

- View Sharp™**: Autofocus function that provides a clear view of all of the sample.
- MVA Plus**: Multivariate analysis using various algorithms to judge the similarity of each component.
- KnowItAll®-Building Library**: Spectral database that can identify particles consisting of various substances.

KnowItAll is a registered trademark of John Wiley & Sons, Inc. in certain jurisdictions. Created specially for JICA Clean City Initiative (JCCI) Seminar, held on Jan 19, 2022.

Product Digest

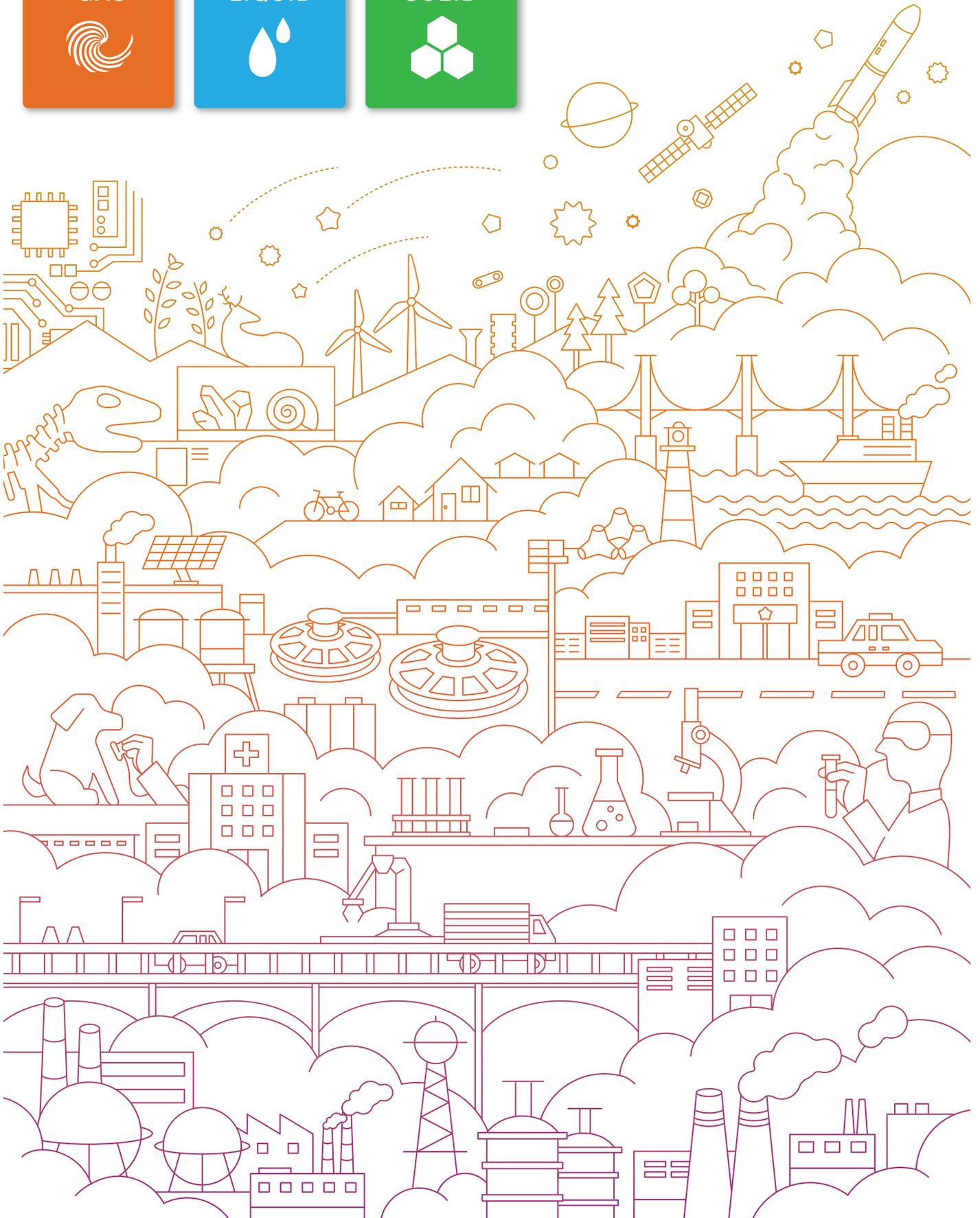
GAS



LIQUID

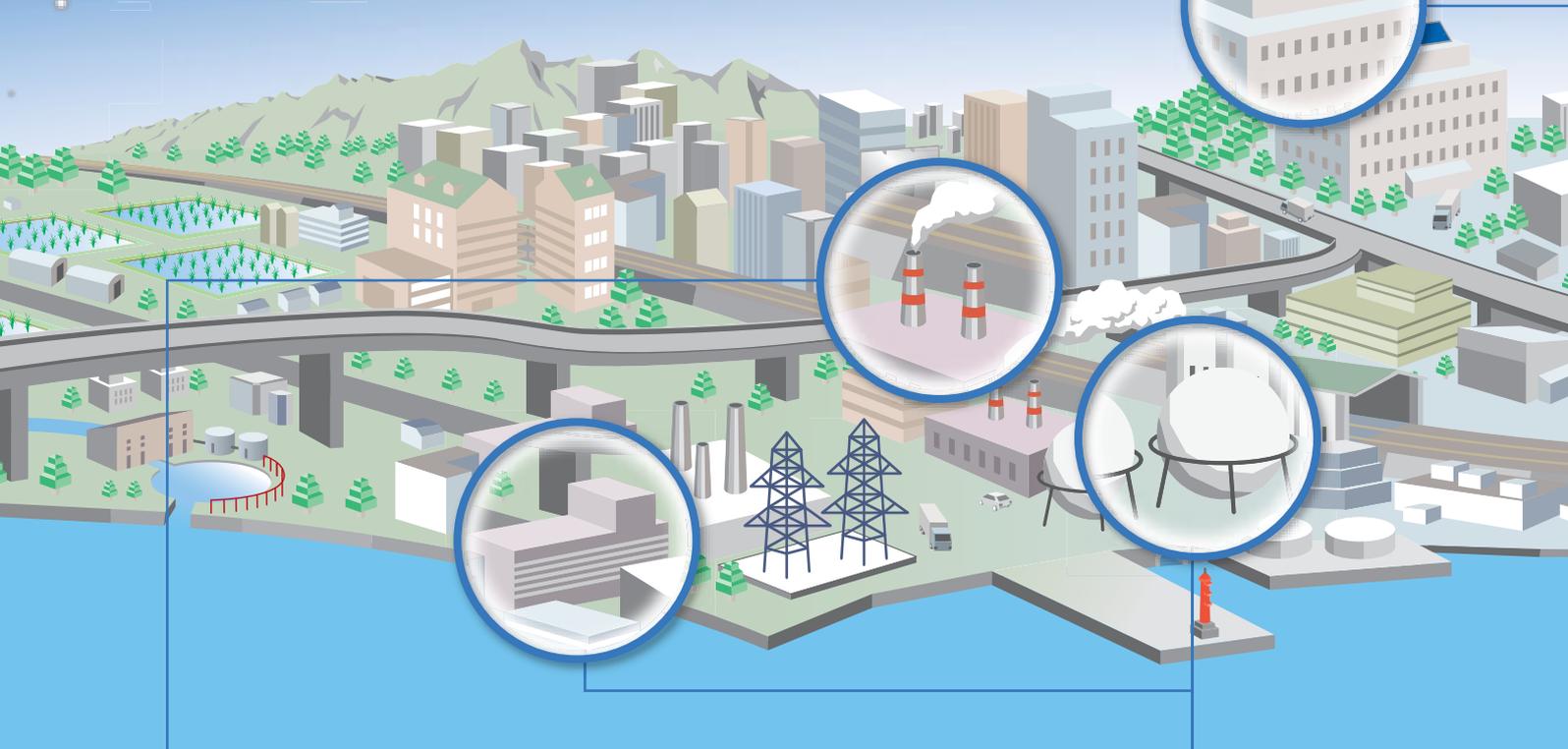


SOLID





Contributes to our lives in a wide range of fields from monitoring quality and safety to R&D of new energy, automobiles and etc.



Environmental protection

Factory

New materials and new energy R&D

Laboratory

Power Plant

Environmental protection

- Air pollution monitoring
- Hazardous materials
- Discharge regulation from plants etc.



AP-370 Series

Ambient Trace Gas Analyzer

- NO ●NO₂ ●NO_x ●NH₃ ●SO₂
- H₂S ●O₃ ●CO ●CO₂ ●CH₄ ●THC
- NMHC ●SPM ●PM_{2.5} ●PM₁₀



TX-100

Tunable Laser Gas Analyzer

- HCl
- Moisture contents



VA-5000/VS-5000 Series

Multi Component Gas Analyzer

- NO ●NO_x ●N₂O ●SO₂ ●CO ●CO₂ ●CH₄ ●O₂ etc.



PX-375

Continuous Particulate Monitor with X-ray Fluorescence

- Mass concentration and elemental concentration of particulate matters (PM_{2.5}, PM₁₀, TSP)
- Heavy metal



ENDA Series

Stack Gas Analyzer

- NO ●NO₂ ●NO_x ●NH₃ ●SO₂
- CO ●CO₂ ●O₂



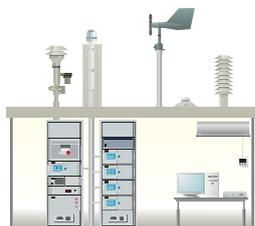
PG-300 Series

Portable Gas Analyzer

- NO_x ●SO₂ ●CO ●CO₂ ●O₂ ●CH₄

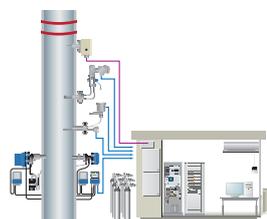


Mobile Air Pollution Monitoring Laboratory



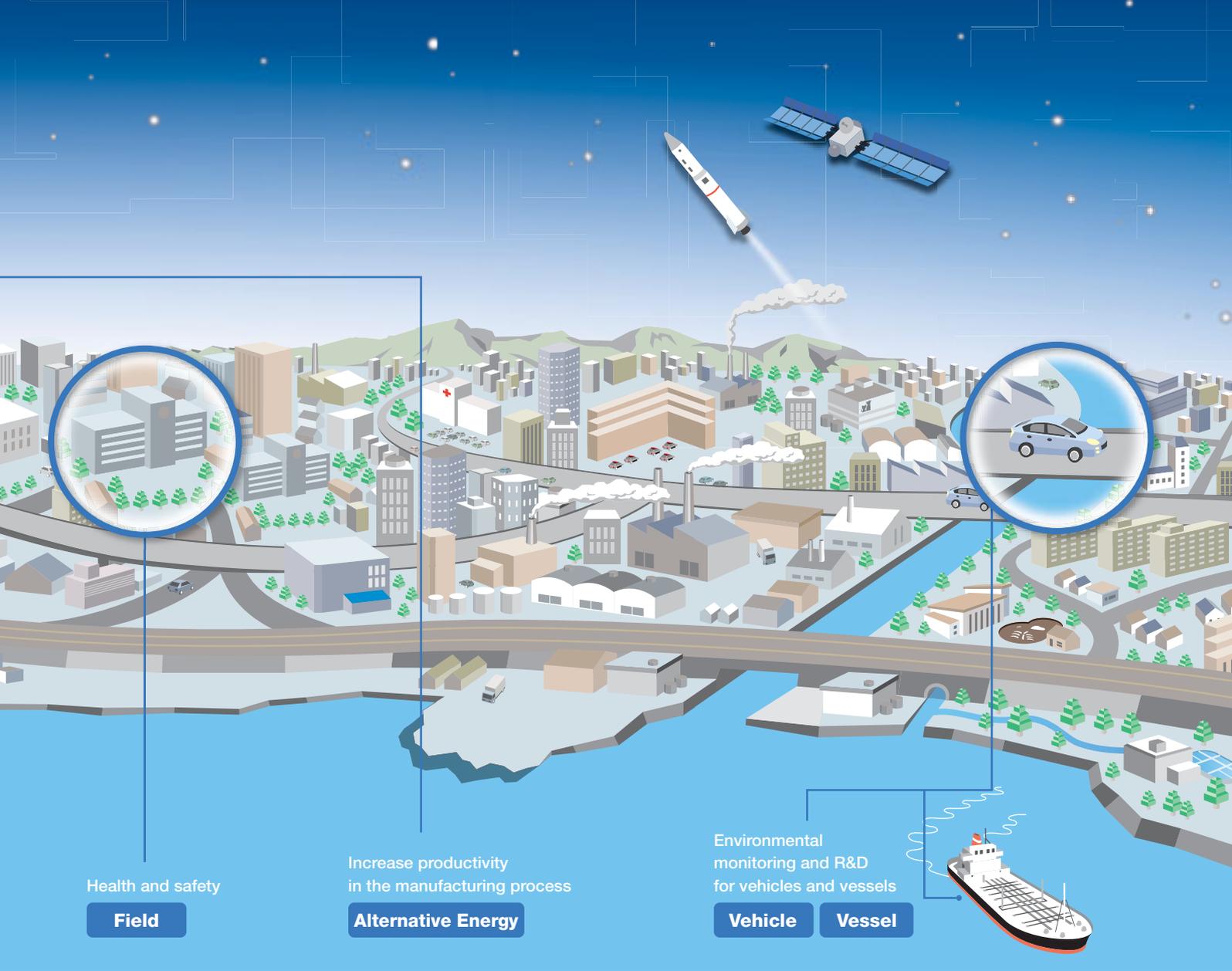
AQMS

Air Quality Monitoring System



CEMS

Continuous Emission Monitoring System



Health and safety

Field

Increase productivity in the manufacturing process

Alternative Energy

Environmental monitoring and R&D for vehicles and vessels

Vehicle

Vessel

Health and safety

- Environmental radiation measurement etc.



PA Series

Environmental Radiation Monitor

- γ (gamma) rays

Increase productivity in the manufacturing process

- Semiconductor devices
- Petrochemical plants
- Steel · Ceramics
- Flat-panel displays (FPD)
- Solar panels etc.



GA-370

Trace Gas Monitor

- CO ● CO₂ ● CH₄



SEC-Z500X Series

Thermal Mass Flow Controller

- Gas flow rate control

Environmental monitoring and R&D for vehicles and vessels

- Ultra low exhaust gas
- Low fuel consumption
- Greenhouse gas
- Alternative fuel
- Engine drive-train break
- Electronic motors
- Eco-drive etc.



MEXA Series

Motor Exhaust Gas Analyzer

- CO ● CO₂ ● HC ● N₂O ● O₂ ● NO
- NO₂ ● NO_x ● CH₄ ● THC ● NMHC



OBS-ONE Series

On-Board Emissions Measurement System

- CO ● CO₂ ● NO ● NO₂ ● NO_x
- CH₄ ● THC ● NMHC
- Air-to-fuel ratio
- Exhaust gas flow rate
- Particulate Matter (PM)
- Particle Number (PN)



VULCAN

48-inch Chassis Dynamometer

- Reproduction of on-road driving state



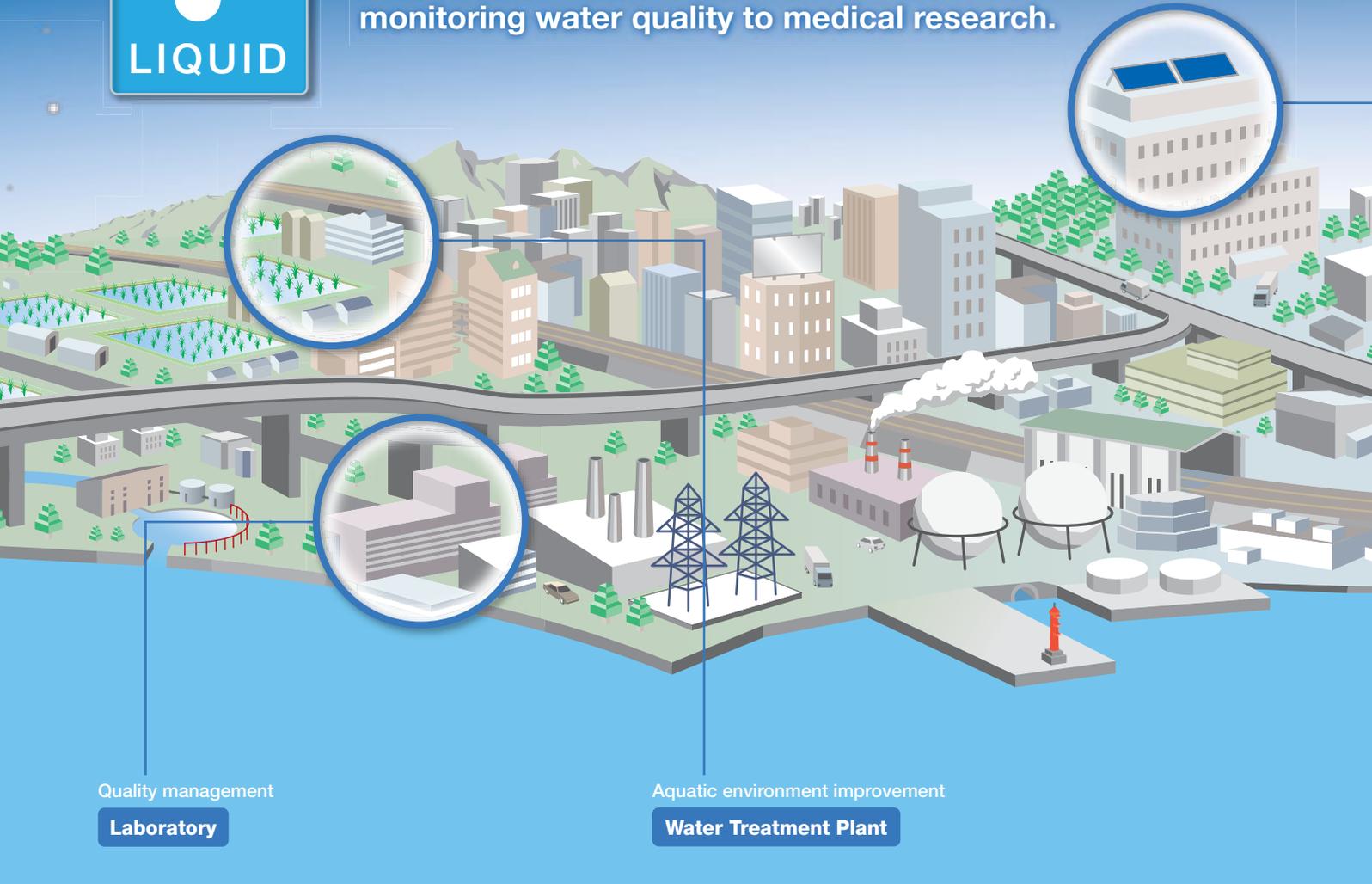
MEXA-820 NO_x

NO_x Analyzer for Marine

- NO_x ● O₂



Supports human health in various fields from monitoring water quality to medical research.



Quality management
Laboratory

Aquatic environment improvement
Water Treatment Plant

Quality management

- Electrical appliances ● Food
- Cosmetics ● Medicine ● Fiber etc.



LAQUAtwin Series
Compact Water Quality Meter
●pH ●Electrical conductivity
●Ion ●Salinity ●TDS



Aqualog
Steady-State Compact Benchtop Fluorometer for CDOM
●Fluorescence spectrum
●Absorbance



LAQUA Series
Benchtop pH/Water Quality Analyzer
●pH ●Oxidation-reduction potential (ORP)
●Electrical conductivity
●Electrical resistivity ●Ion ●Salinity ●TDS

Aquatic environment improvement

- Improvement of soil-water quality
- Water supply and sewerage monitoring ● Security etc.



H-1 Series
Industrial Water Quality Analyzer
●pH ●Oxidation-reduction potential (ORP)
●Dissolved oxygen ●Fluoride ion concentration ●Ammonia nitrogen
●Electrical conductivity ●Electrical resistivity ●Activated sludge (MLSS)
●Turbidity ●Residual chlorine ●Chromaticity



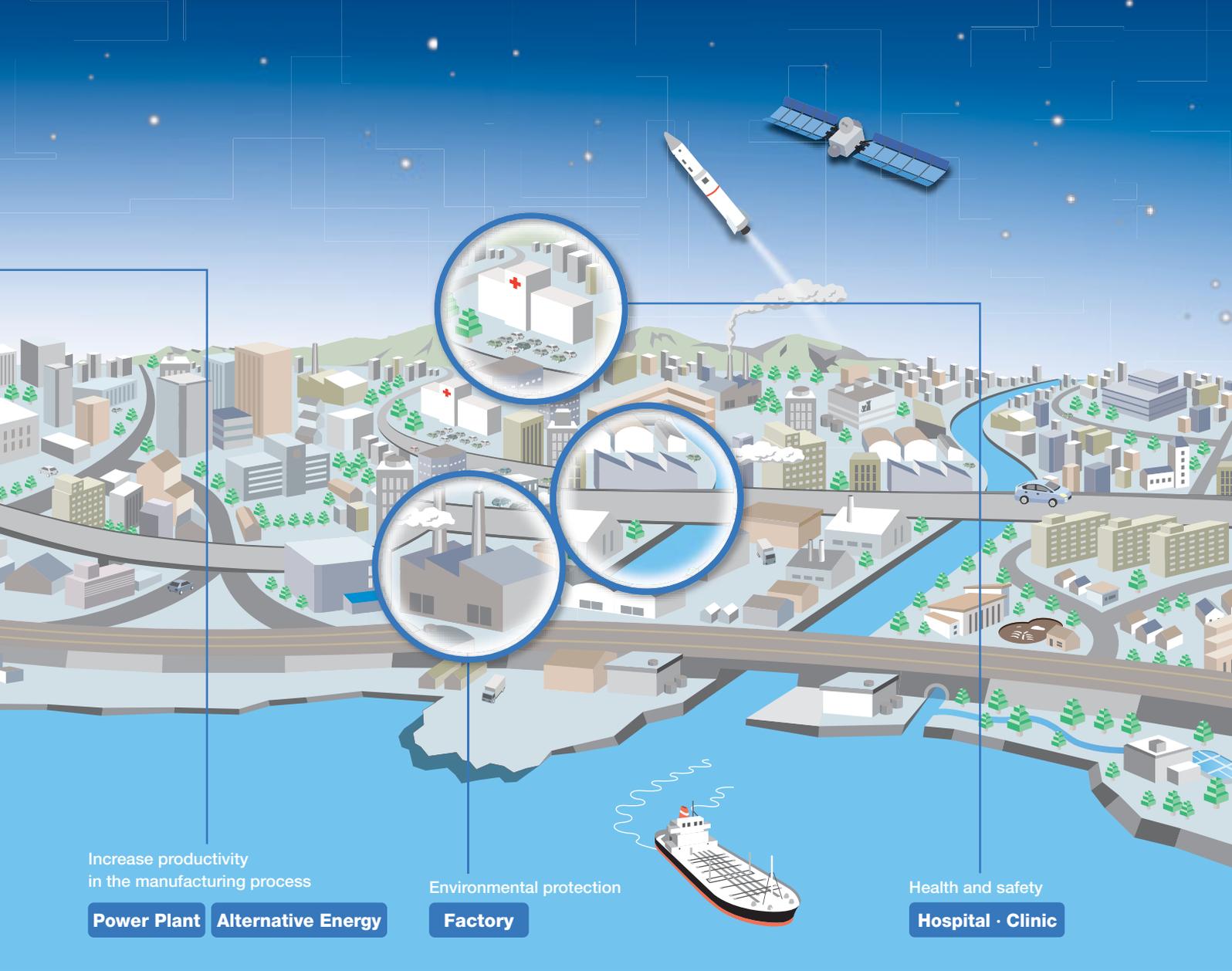
TW-100
Water Distribution Monitor
●Turbidity ●Chromaticity
●Residual chlorine
●Water pressure
●pH ●Electrical conductivity
●Water temperature



TPNA-500
Automatic Total Nitrogen/Phosphorus Monitoring System
●Total nitrogen
●Total phosphorus



WQMS
Water Quality Monitoring System



Increase productivity in the manufacturing process

Power Plant **Alternative Energy**

Environmental protection

Factory

Health and safety

Hospital · Clinic

Increase productivity in the manufacturing process

- Semiconductor devices
- Coating · Painting
- Flat-panel displays (FPD)
- Petrochemical plants
- Solar panels
- Steel · ceramics
- Printed circuit boards etc.



●Measuring element: Sulfur

SLFA Series

X-ray Fluorescence Sulfur Analyzer



CS-700

Chemical Solution Concentration Monitor

●HNO₃ ●HF ●H₃PO₄ ●H₂SIF₆ ●H₂O

Environmental protection

- Hazardous materials
- Discharge regulation from plants
- Chemical fertiliser
- Water quality regulation
- Agriculture · Water for daily life
- Water quality monitoring etc.



U-50 Series

Multi-Parameter Water Quality Checker

- pH ●Oxidation-reduction potential (ORP)
- Electrical conductivity ●Salinity
- Specific gravity of seawater
- Dissolved oxygen ●Water temperature
- Turbidity ●Water depth ●GPS



OCMA Series

Oil Content Analyzer

●Oil contents



CODA-500

Automatic COD Monitor

●Chemical oxygen demand



OPSA-150

Organic Pollutant Monitor

●Organic pollutants



Microsemi Series

Hematology & CRP Analyzer

- 3 part differential of white blood cells
- CRP (C-reactive protein)



Antsense Series

Small-Sized Electrode Type Blood Glucose Meter

●Blood glucose concentration

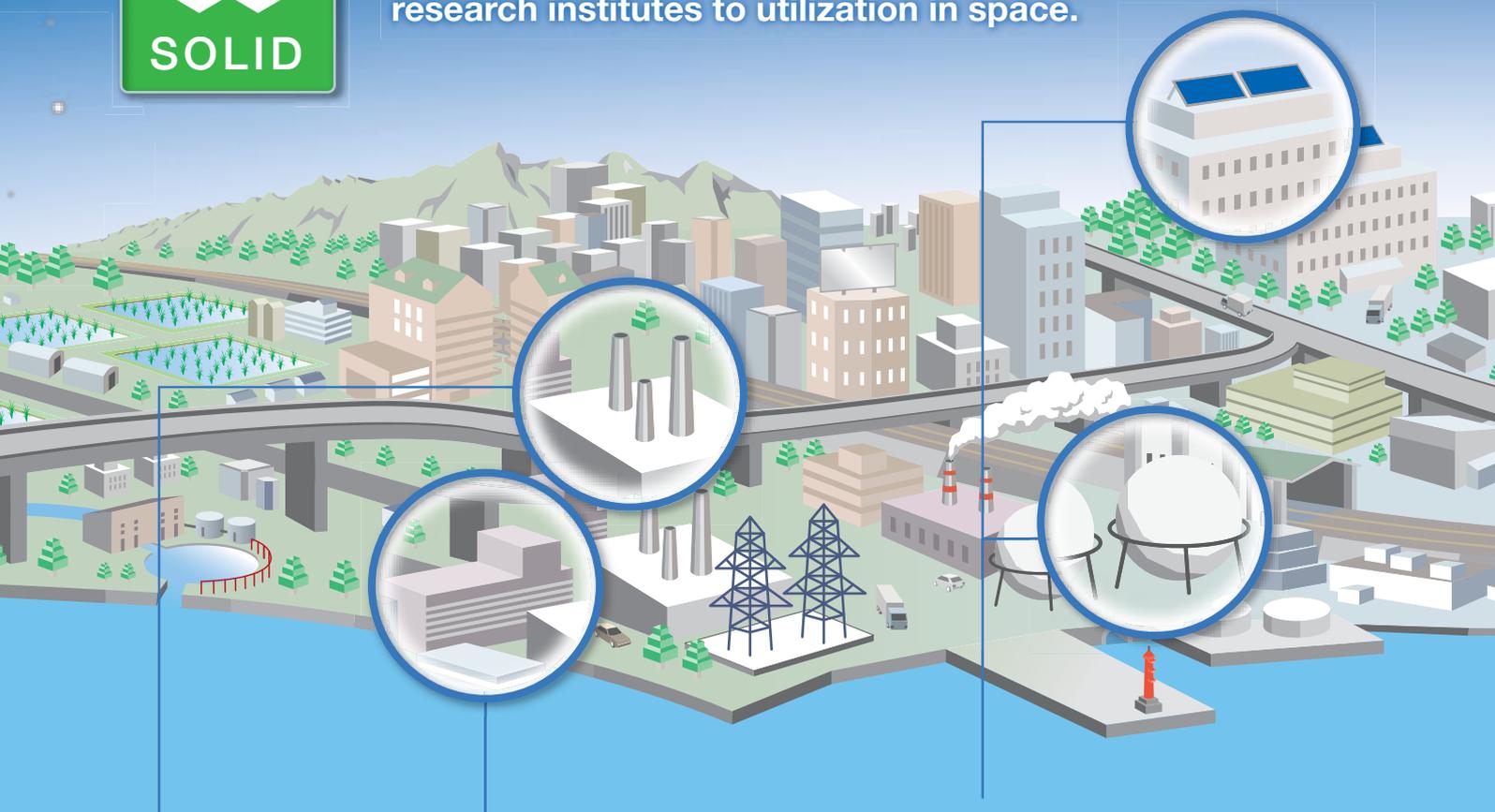
Health and safety

- Medical inspection etc.

The 2 products below are sold for health care providers.



Supports a wide range from R&D in universities and research institutes to utilization in space.



Quality management

Factory

New materials and new energy R&D

Laboratory

Increase productivity in the manufacturing process

Power Plant Alternative Energy

Quality management

- Electrical appliances
- Food ● Cosmetics
- Medicine ● Fiber etc.



Partica Series

Laser Scattering Particle Size Distribution Analyzer



nano Partica Series

Nano Particle Analyzer



- Layer thickness
- Elemental composition of layer
- Measuring elements: Hydrogen ~ Uranium

GD-Profiler2

Pulsed RF Glow Discharge Optical Emission Spectrometer

New materials and new energy R&D

- Next generation materials
- Rechargeable batteries
- Next generation display etc.



NanoLog Series

Near Infrared Spectrofluorometer



DeltaFlex/DeltaPro

Fluorescence Lifetime Spectrometer



Duetta

Fluorescence and Absorbance Spectrometer



- Layer thickness
- Thin film characterization

UVISEL Plus

Fully Automated Ellipsometer

Increase productivity in the manufacturing process

- Semiconductor devices ● Painting · Coating
- Flat-panel displays (FPD) ● Petrochemical plant
- Solar panels ● Steel · Ceramics
- Printed circuit boards etc.



EMIA Series

Carbon/Sulfur Analyzer

- Measuring elements: Carbon, Sulfur

EMGA Series

Oxygen/Nitrogen/Hydrogen Analyzer

- Measuring elements: Oxygen, Nitrogen, Hydrogen



IT-480 Series

Stationary Type Non-Contact Infrared Thermometer

- Temperature



IG Series

Gloss Checker

- Gloss



PR-PD3

Reticle/Mask Particle Detection System

- Reticle/Mask Particle Detection



Health and safety
Field

Forensic science
Police Station

Art and archaeology
research
Museum

Advanced materials and
functional materials
Research Institute

Health and safety

- Environment radiation measurement etc.



PA Series
Environmental Radiation Monitor
● γ (gamma) rays

Forensic science

- Identification etc.



CRIMESCOPE/HANDSCOPE
Forensic Light Source
● Fingerprints
● Trace of footprints etc.

Art and archaeology research

- Art museum
- Museum
- Protection of cultural properties
- Minerals etc.



XGT Series
X-ray Analytical Microscope
● Measuring elements: Sodium ~ Uranium

Advanced materials and functional materials

- Fine ceramics
- Carbon nanotubes
- Hybrid materials etc.



Space Flight Gratings



LabRAM HR Evolution
Laser Raman Spectroscop



MESA-50 Series
X-ray Fluorescence Analyzer
● Measuring elements: Aluminium ~ Uranium

HORIBA Global Network

HORIBA's global network responds to customer needs about analysis and measurement world-wide.



BELGIUM
HORIBA Europe GmbH, Antwerp Branch
Antwerp

NETHERLANDS
HORIBA Europe GmbH, Netherlands Branch
Eekersrijt

CHINA
HORIBA (China) Trading Co., Ltd., Guangzhou Branch
Guangzhou
Beijing HORIBA METRON Instruments Co., Ltd.
Beijing
HORIBA (China) Trading Co., Ltd., Beijing Branch
Beijing
HORIBA Instruments (Shanghai) Co., Ltd.
HORIBA (China) Trading Co., Ltd., Shanghai Technical Center
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Shanghai

UNITED STATES
HORIBA Instruments Incorporated
Atlanta Field Office
Chicago, IL Field Office
Ann Arbor Office
Troy Office
Baltimore Field Office
HORIBA New Jersey Optical Spectroscopy Center
Albany Field Office

GERMANY
HORIBA Europe GmbH
Oberursel, Darmstadt, Leichlingen, Hanover, Potsdam, Munich, Stuttgart (Neuhausen, Boeblingen), Dresden, Wolfsburg, Korschbroich
HORIBA JOBIN YVON GmbH
Bensheim
HORIBA Fuelcon GmbH
Bensheim

FRANCE
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Les Ulis
HORIBA FRANCE SAS
Longjumeau, Lille
HORIBA Europe Research Center
Paris Saclay
HORIBA ABX SAS
Montpellier

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HORIBA (Austria) GmbH, Romania Branch
Ploesti

RUSSIA
HORIBA OOO
Moscow, Zelenograd

TURKEY
HORIBA Europe GmbH, Istanbul Office
Istanbul

SWEDEN
HORIBA Europe GmbH, Sweden Branch
Soderalje, Gothenburg

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Anyang-Ulsan
HORIBA STEC Korea, Ltd.
Yongin

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Bangkok

UNITED STATES
HORIBA Instruments Incorporated
Houston Office
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Irvine Office
Sunnyvale Office
HORIBA Reno Technology Center
Portland Office
Tampa Field Office
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HORIBA (Austria) GmbH
Tulln

SINGAPORE
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Singapore
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Singapore

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Zhubei
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Tainan

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HORIBA Instruments Brasil, Ltda.
Sao Paulo
TCA / HORIBA Sistemas de Testes Automotivos Ltda.
Sao Paulo

CZECH
HORIBA Czech Olomouc Factory
Olomouc
HORIBA Czech Prague Office
Prague

Vietnam
HORIBA Vietnam Company Limited
Hanoi

PHILIPPINES
HORIBA Instruments (Singapore) Pte Ltd., Manila Office
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