



WIKA Instrumentation for Hydrogen Applications

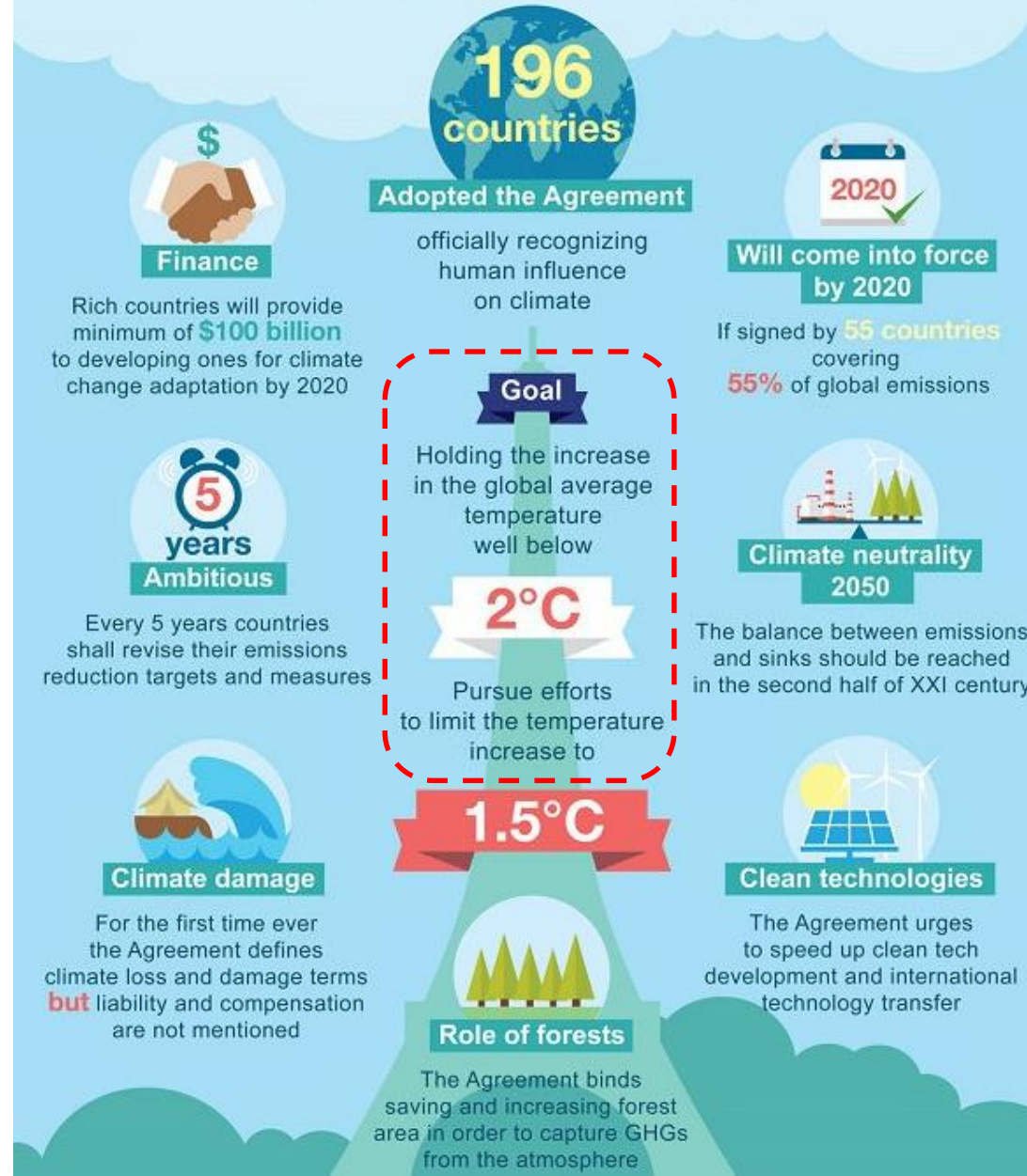


PARIS CLIMATE AGREEMENT

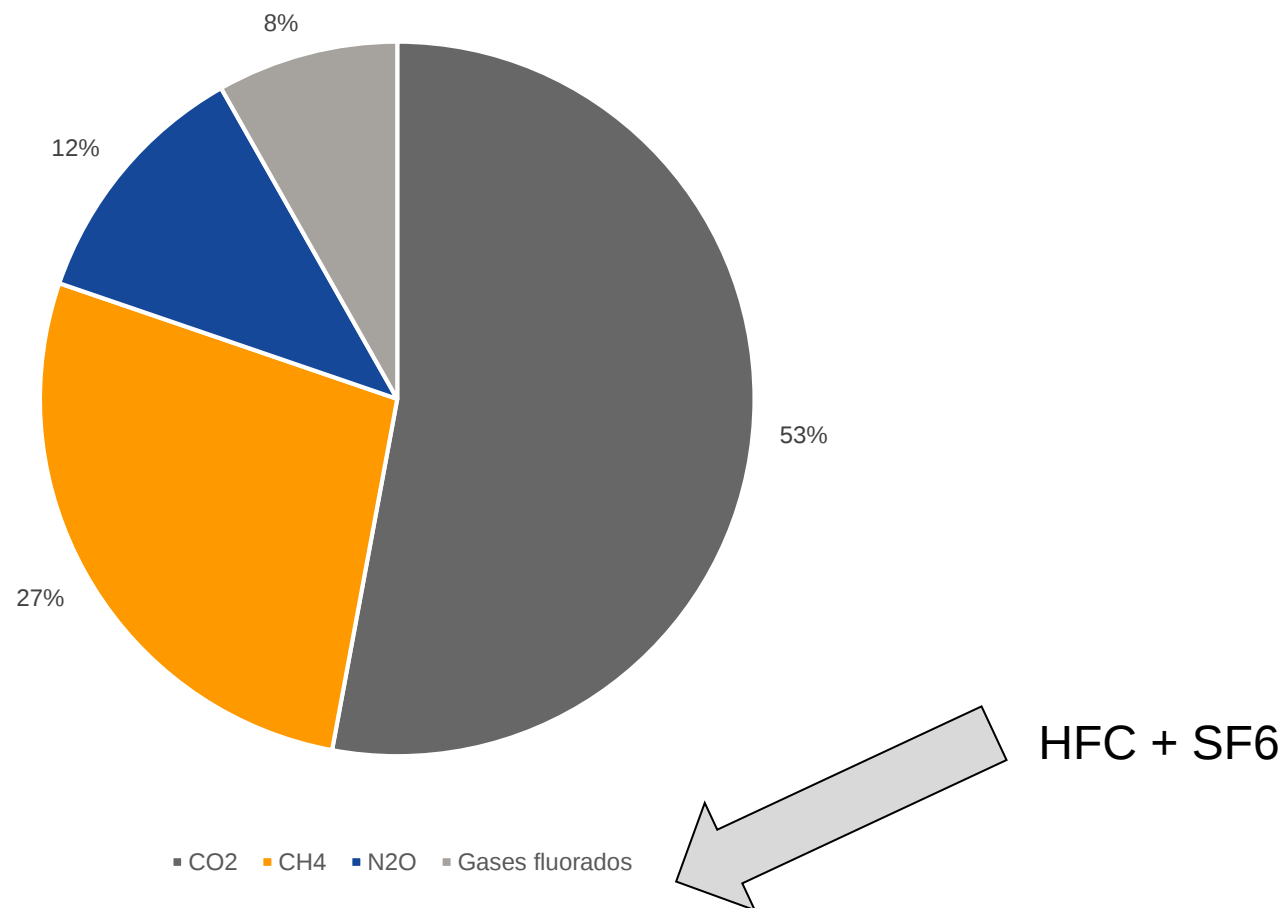
Historical document that legally binds the whole World to participate in climate change fight.

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Smart in sensing



Gases de efecto invernadero 2020 en Chile Ministerio Medio Ambiente de Chile



Potencial de calentamiento global de gases

GWP values and lifetimes	Lifetime	Global warming potential, GWP
	(years)	100 years
Sulfur hexafluoride SF6	3200	24000
Hydrogen (H2)	4	5,8

1 kg de SF6 equivale a 24000 kilos de CO2!

Si el H2 no es consumido y **se fuga** al ambiente, tiene un potencial de casi 6 veces el CO2

El H2 se considera un gas de efecto invernadero INDIRECTO

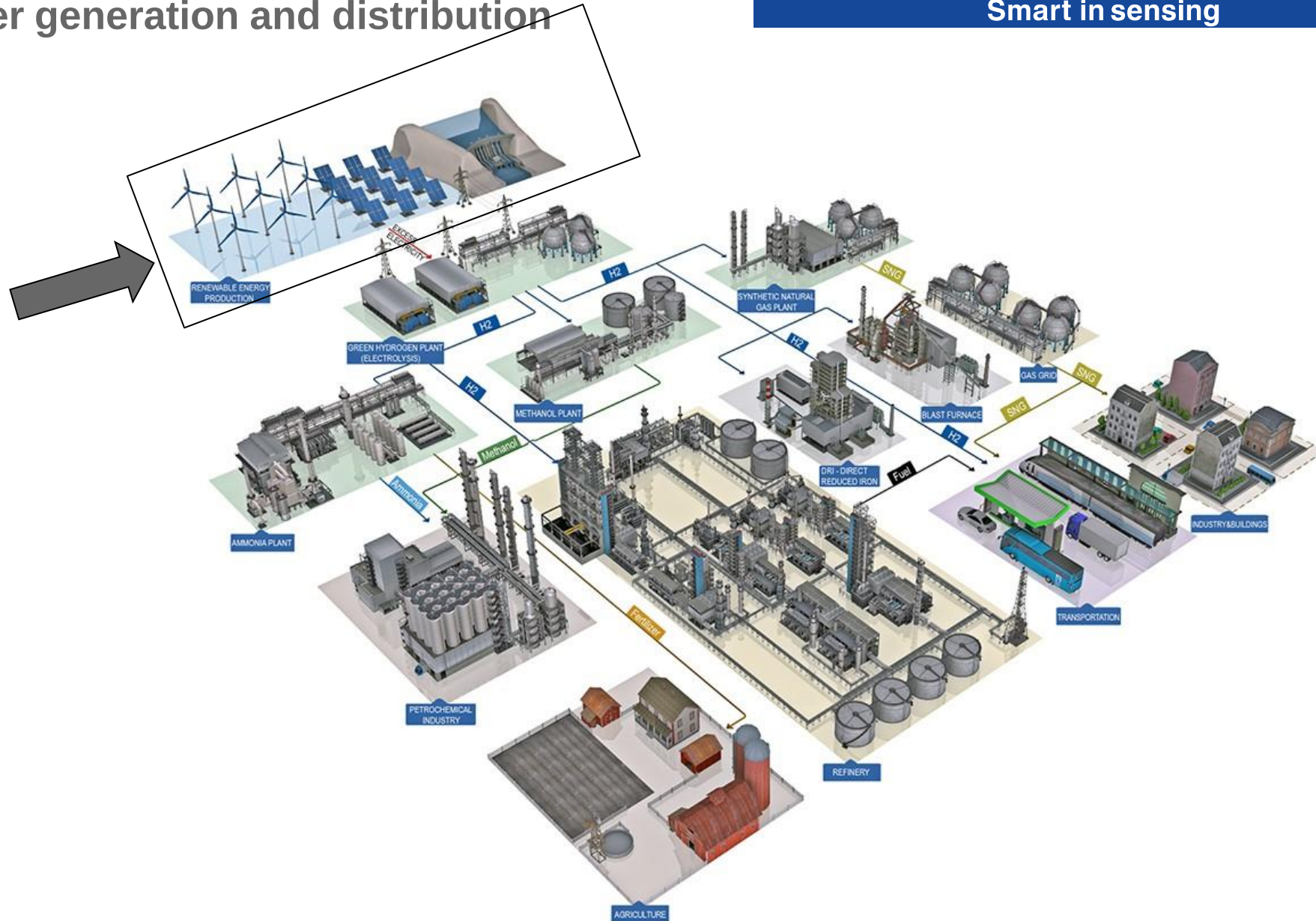
Instrumentation for Hydrogen Applications

Fugitive emissions power generation and distribution

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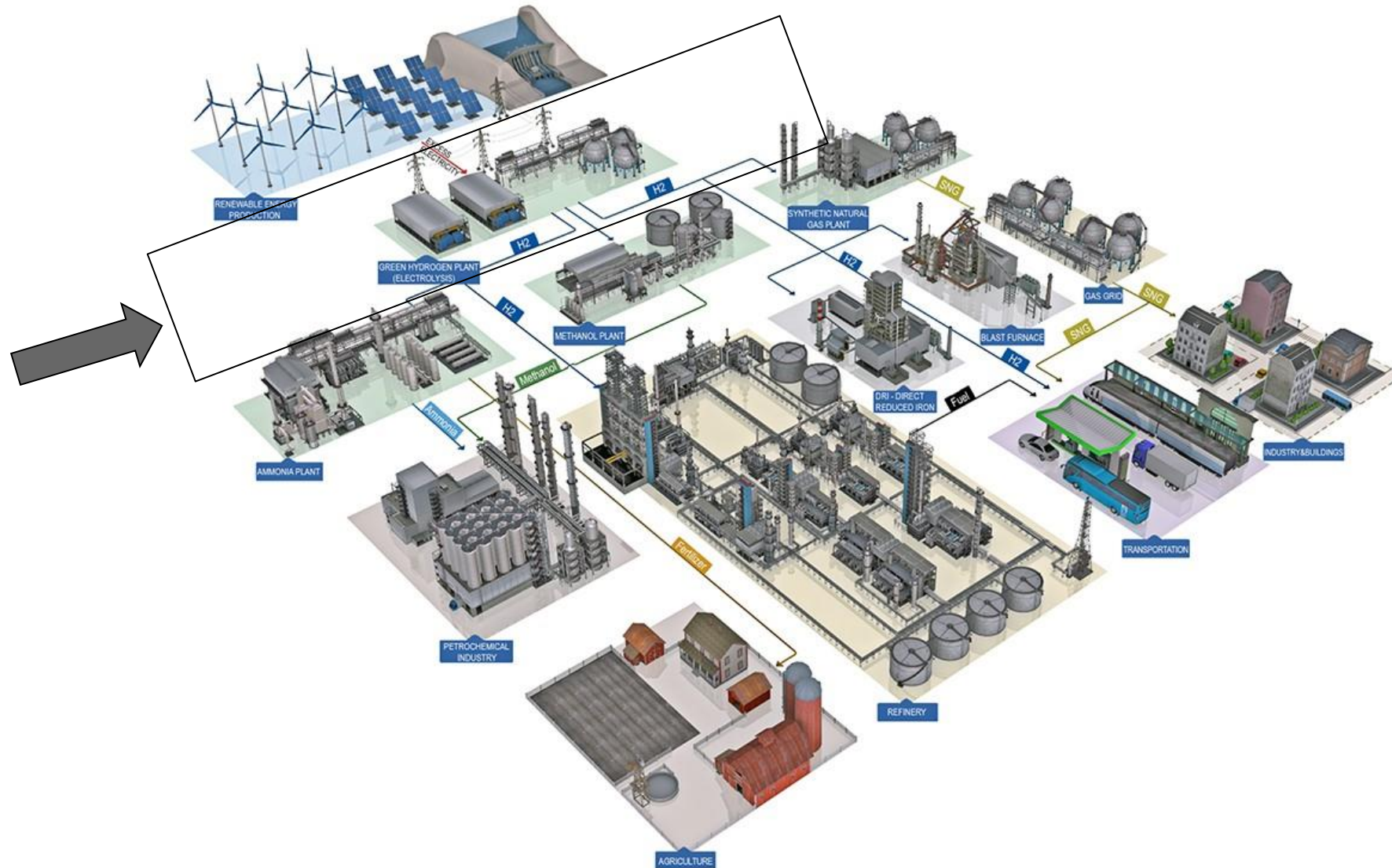
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Power and distribution
(SF6)



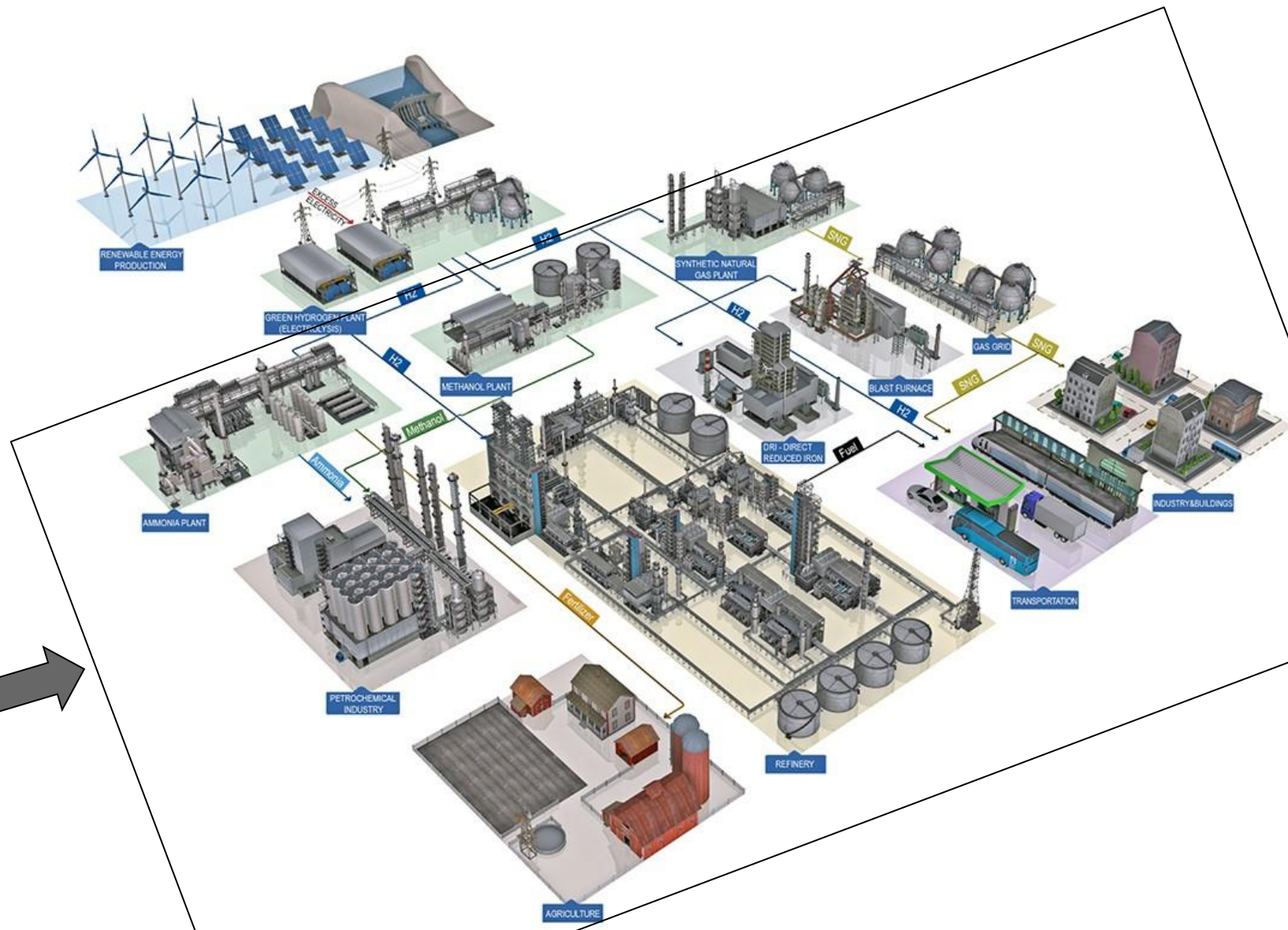
Fugitive emissions on electrolysis

Electrolysis (H₂ production)
(SF₆, H₂)



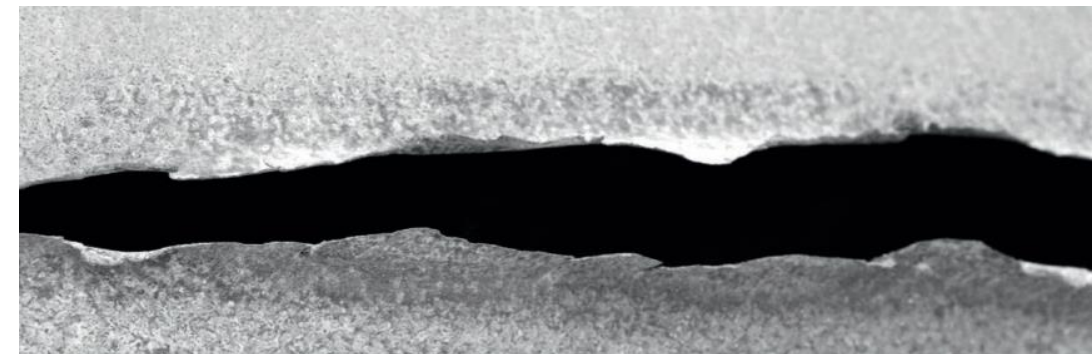
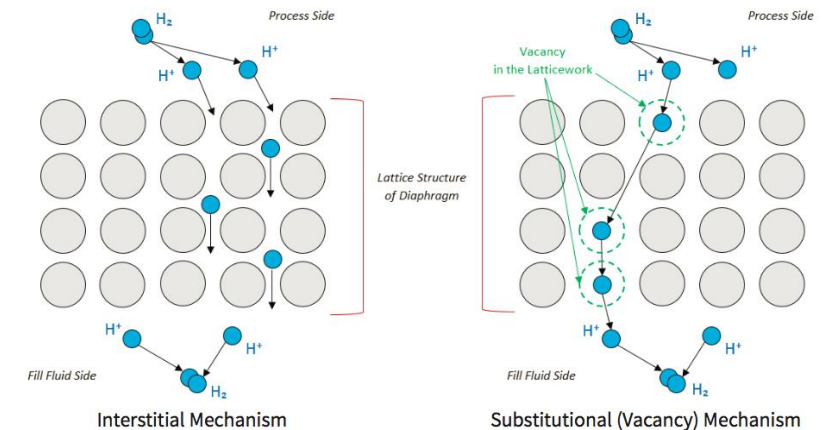
Fugitive emissions on power to X

Power to X
(SF₆, H₂, others)



H2 risks

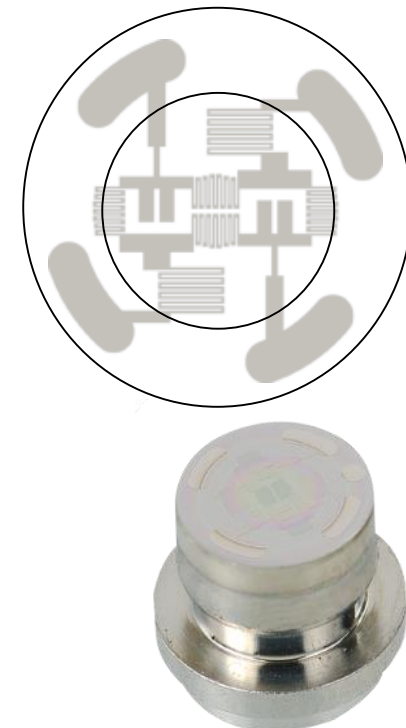
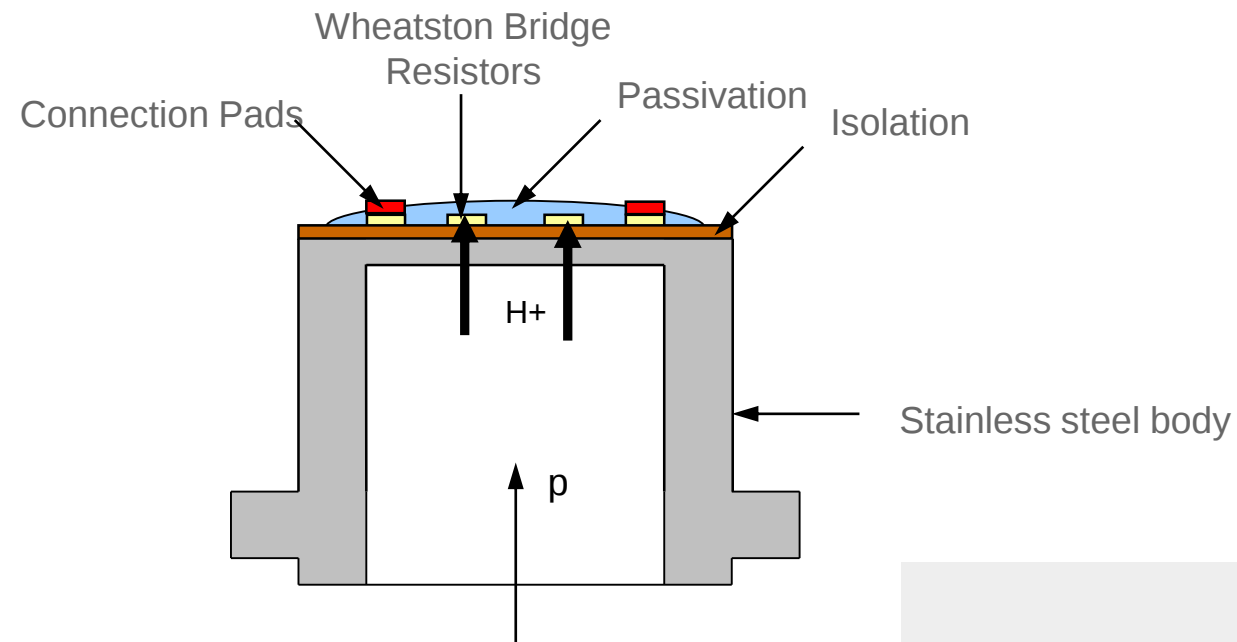
- H₂ is one of the smallest molecules, it dissociate easily into H⁺ ions with a Little energy (pressure or temperature)
- H⁺ can permeate Stainless Steel
- H⁺ can permeate rubber
- H⁺ can occupy vacant spaces on Steel structure
- H⁺ can embrittle Steel and make it fragile
- H₂ is potentially explosive
- Indirect global warming potential 5,8



Membrane failure because H₂ embrittlement

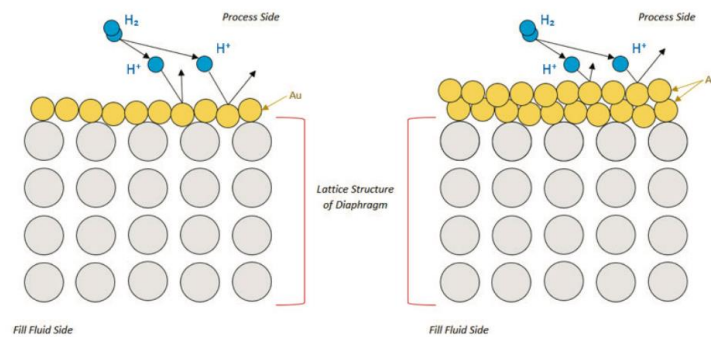
How a metallic pressure transmitter Works?

- Pressure deform the sensor diaphragm
- H^+ traverse the stainless Steel diaphragm
- H^+ deteriorates the measuring chip



Blocking H⁺ permeation

- H⁺ can't permeate gold plating
- H⁺ can't permeate elgiloy super alloy
- Both materials are recommended to measure Hydrogen



EMMICO GAUGE

- Only emission controlling gauge in the world
- Special design prevent fugitive emission (double seal)



Safety pattern design
Model 23x.30 or 26x.30

Available options

- High pressure ranges
- Material certificate per EN 10204 3.1
- Liquid-filled case
- Various units of measurement
- Accuracy $\pm 1\%$ FSD
- Stainless steel 316L and Monel 400

Redundant metal-to-metal sealing
Swivel connection



Monoflange
IVM



Block-and-bleed valve
IV20



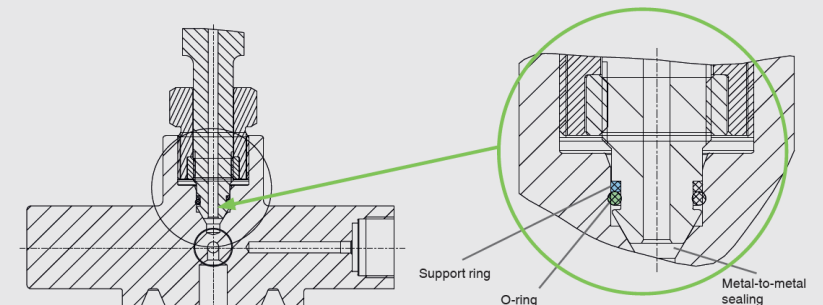
Needle valve and multiport valve
IV10, IV11

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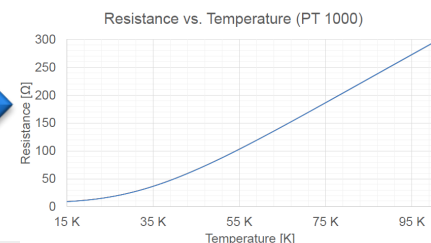
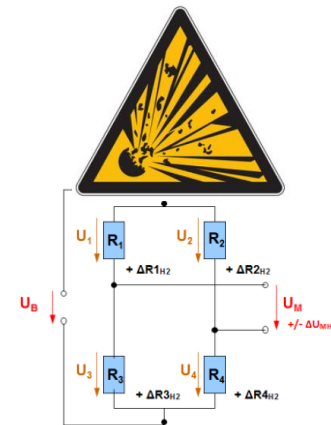
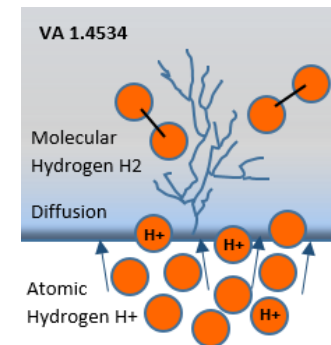


Pressure gauge can be rotated by 360°



H₂ Measurement Solutions Overcoming Challenges

Demand	Challenge	Solution
H ₂ compatible material	Risk of Hydrogen embrittlement	Austenitic stainless steel (i.e. 316L; 2.4711 Elgiloy)
No loss of containment	Hydrogen penetrates materials and is explosive	Welded adaption of process media wetted components, polymeric sealing is usually not favoured
Long term stability of signal	Hydrogen may cause sensor signal offset	H ₂ permeation resistant sensor materials & applied barriers (i.e. Glass, Gold, Ceramics....)
Extreme operating conditions (pressure & temperature)	Longevity and accuracy of sensor	Special sensor design solutions and qualification testing



SF6

SF6 Fugitive emissions



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Transmission and Distribution SF6 equipment

Indoor substation (GIS)



Outdoor substation (GIS)



LT HV Circuit Breaker



DT HV Circuit Breaker



Offshore substation (GIS)



Gas insulated transformer



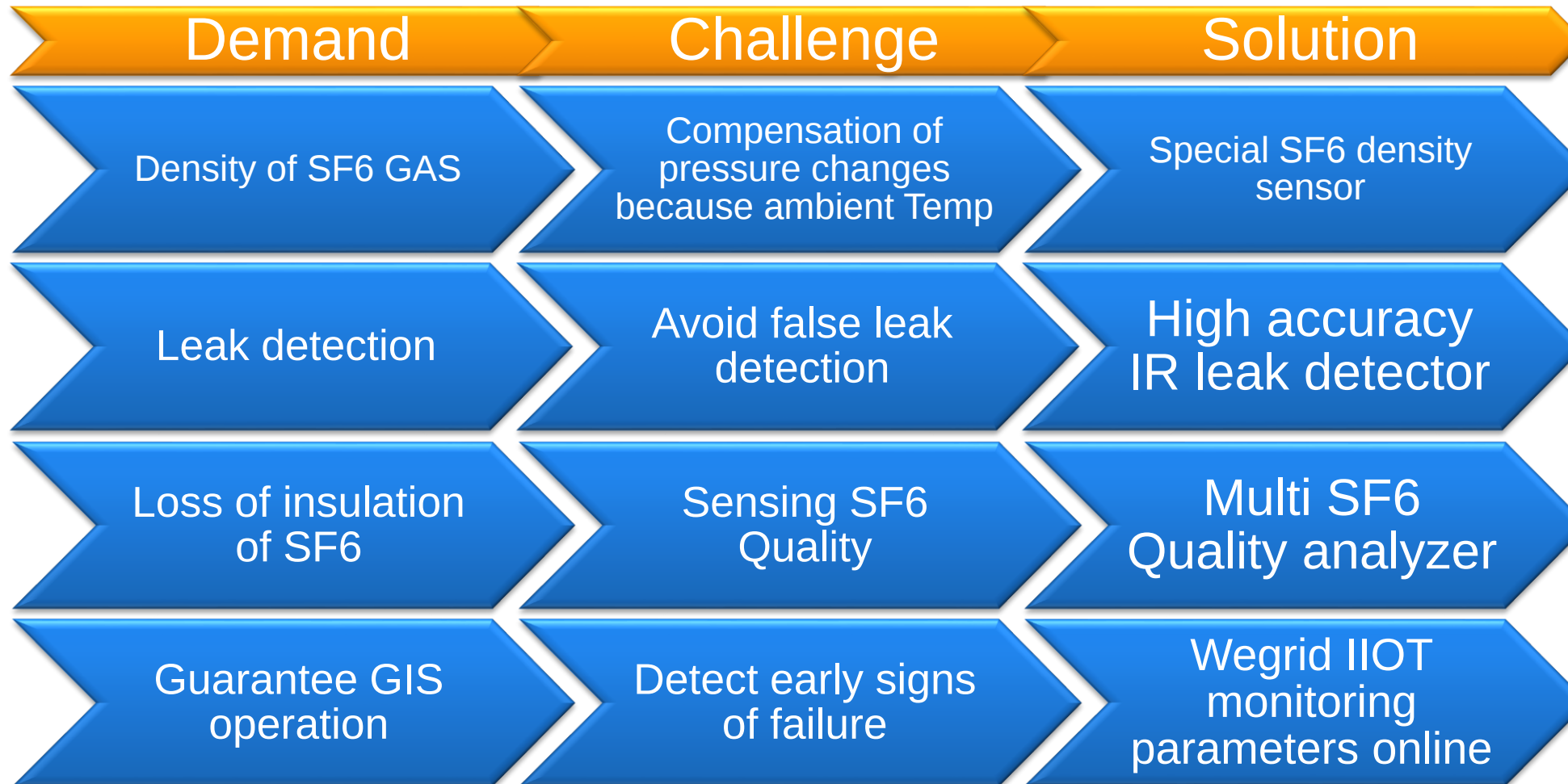
Ring Main Unit



Generator Main Circuit Breaker



SF6 Measurement Solutions Overcoming Challenges



Instrumentation Solutions for hydrogen applications

Temperature measurement solutions

Our temperature measurement solutions embrace the full spectrum of the green and conventional hydrogen value chains incl. electrolyzer temperature monitoring, steam methane reformer (SMR) temperature monitoring and tank & pipeline integrity monitoring.



Always the right certificates

Electronic pressure sensors

Depending on the application WIKA provides a portfolio of electronic pressure transmitters with certifications required to meet your regulatory requirements, including:

- ATEX/IECEx for stationary applications as provided by the pressure sensors IS-3, E-10 or others
- EC79/2009 for mobile applications as available for the model MH-3-HY



Instrumentation Solutions for hydrogen applications

Preventing fugitive emissions

Valve and manifold solutions

No matter if your process interface is threaded, flanged or via compression type fitting WIKA instrumentation valve solutions connect the desired instrument leak tight and enable you to shut off your process safely.



Extra protection when needed

Gold-plated solutions

Under certain environmental conditions, especially at high temperatures, additional protection may be required to ensure a long-term stable measurement. For this purpose WIKA provides optional gold plating on diaphragm seals or front flush pressure sensors.



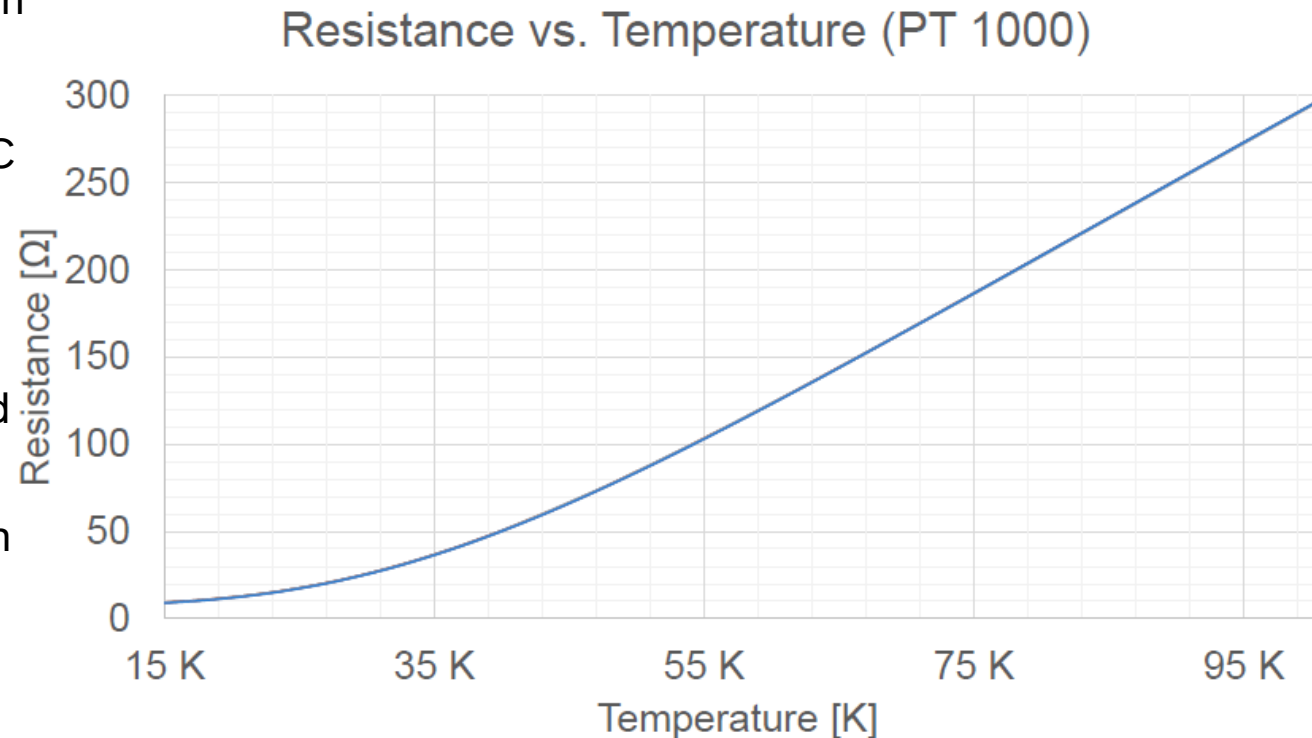
Temperature Instrumentation Solutions

- Broad portfolio of electric & dial temperature sensors & switches
- Sensor ranges (electric temperature) from -258 ... +1700° C
- For use in electrolyzers, cooling water units, demin water units, pipe temperature measurement...



Temperature Measurement for LH₂ (new development)

- The WIKA PT1000 temp. Sensor „TE60.0x“ in combination with the digital temperature transmitter „TE32.04“ can realize reliable temperature measurements down to -258° C at a confirmed accuracy of +/- 3 Kelvin
- An even better accuracy can be achieved by extensive additional efforts.
- Available „Ex approvals“ are not affected and can be used without any limitation.
- The „TE32“ transmitter allows a configuration down to -258° C



TE32.04



TE60.0x

Pressure Instrumentation Solutions

Specifications:

- Pressure range: -1 / 0 20 to 600 / 1050 bar
- Temperature range: -70 ... +150° C
- Ex ia / Ex d (Zone 1) Ex d (Zone 2) (ATEX, FM, CSA, IECEx)
- Accuracy < 1 % @ ref. condition; depending on design limited long term stability
- Hydrogen compatible material, e.g. gold plating and/or Elgiloy for wetted materials; welded sensor; suitable for outside installation

Applications:

- Electrolyzers, H₂/O₂/Water Separators, Gas dispensers (350 ... 1050 bar), Compressors, Storage tanks (20 ... 1050 bar), H₂ filling stations
- Process Industry (green and conventional H₂ production, ammonia production, cooling media)
- Condition monitoring – e.g. preventive maintenance systems for hydrogen compressors



Level Monitoring Solutions

e.g. for H₂ / O₂ / water separators in electrolyzers

Scope of Supply per Electrolyser

- 4 pcs. dual chamber magnetic level gauge c/w guided wave radar level transmitter for process control
- 4 pcs. single chamber c/w guided wave radar level transmitter for emergency shut down, SIL2 rated, remote LCD display

Technical Features

- All chamber pipes are seamless and full butt weld construction in order to reduce H₂ migration through welds.
- Oil, grease and silicone oil-free version. Cleaning of all the equipment is done in ultrasonic bath. Assembly is done with gloves. The units are wrapped in a sealed foil.
- The radar antenna include a double seal assembly (second line of defense) in order to minimize H₂ migration. The radars pass an helium leak tested at 1.00*E-06 mbar l/s.

Customer Benefits by Using WIKAI Solution

- Complete solution level gauge + radar
- Welding know-how (H₂ and O₂ requirements)
- All units are completely pressure tested (chamber: water; radar: helium & water)



Dual Chamber
Magnetic Level Gauge



Single Chamber
GWR Level Transmitter

Flow Metering Solutions

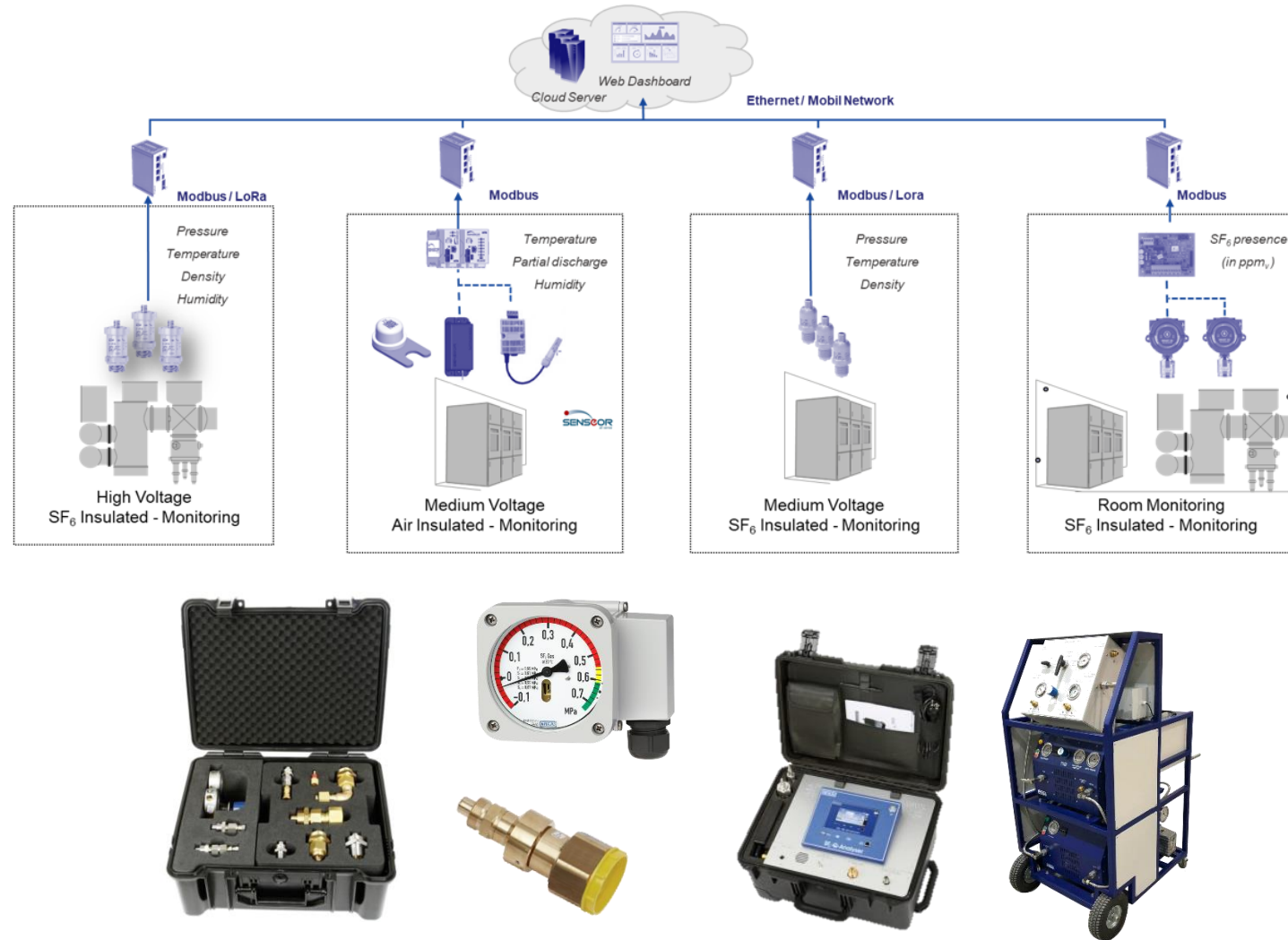
- Broad portfolio of flow meters incl. primary flow components & systems, ultrasonic flow meters and magnetic-inductive flow meters
- Pipe diameters from 0.5" to 106" and beyond
- For a wide range of process media¹ including hydrogen, nitrogen (purge), oxygen, CO₂, water, KOH (lye),...
- For use in electrolyzers, steam methane reformers, cooling water units, demin water units, pipelines, gas grids,...



1) Selection of suitable flow metering solutions depends on many factors incl. process media, pipe diameter, flow velocity, pressure, temperature

WEgrid Solutions for electrolyzer plants and power plants

- Valves and adapters for insulation gases
 - e.g. DN8 & 20
- Insulation gas quality analysers and detectors
 - Purity, humidity, decomposition products
- SF6 gas handling equipment
 - Portable, manual or fully automated
- Gas density monitors
 - For all insulation gases
- Online condition monitoring
 - SF6, clean air
 - Humidity, partial discharge, temperature



En todo el mundo - cerca de nuestros clientes

Presencia global en más de 44 países

WIKAL

Smart in sensing

Nuestros servicios in situ

Ventas/Stock

Asesoramiento, servicio, soluciones
adaptadas

Calibración para instrumentación de
medición de presión y de temperatura

Montaje de separadores

Montaje de sensores de temperatura

Producción

Nuestros centros de producción: Alemania (central), Australia, Brasil, China, India, Italia, Canadá
Corea, Malasia, Polonia, Rusia, Suiza, Sudáfrica, EE.UU.



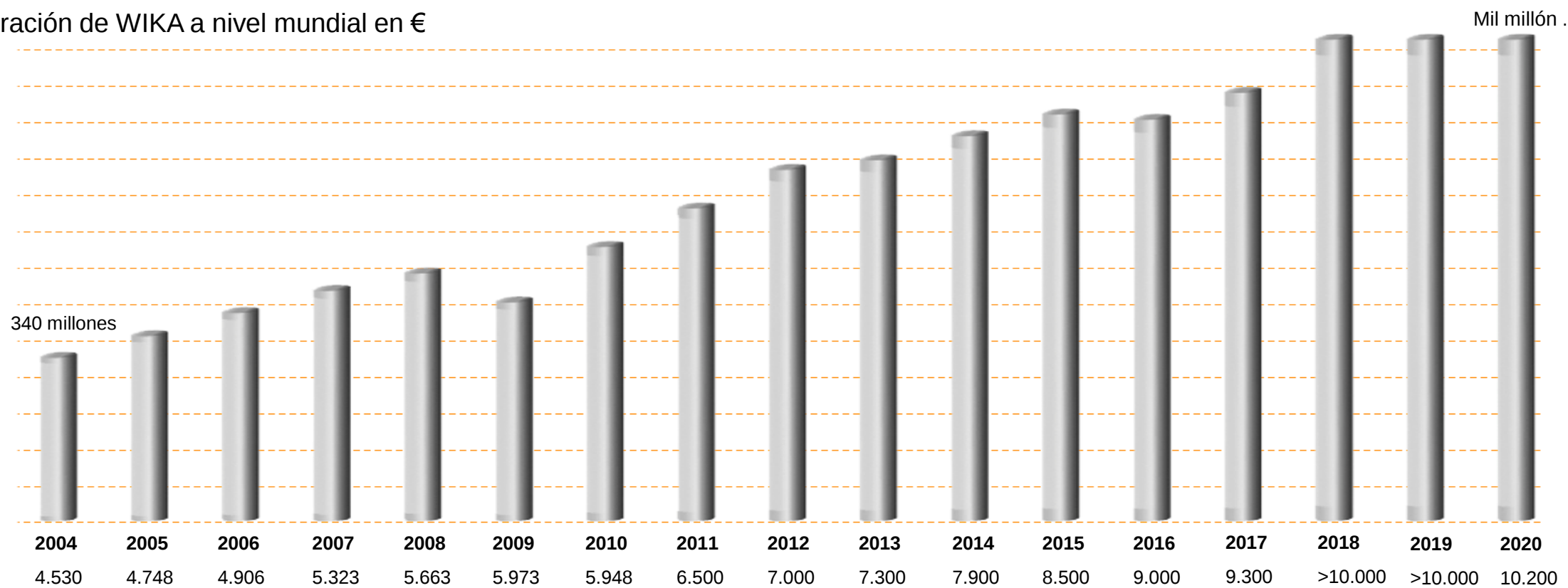
Desarrollo de la empresa

Rumbo al éxito



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■ Facturación de WIKAI a nivel mundial en €



Empleados

(WIKAI internacional)

Gama de productos

Único en amplitud y variedad de gama

WIKAI

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Referencias

Empresas que confían en WIKA

- Generación de energía
- Química/Petroquímica
- Petróleo y Gas
- Alimentos
- Farmacéutica/médica
- Medio Ambiente y Tratamiento de aguas
- Fabricantes de equipos



For further information...



WIKAI Webinar

Live Webinar

12 de Mayo:
PRESIÓN DIFERENCIAL

- Transmisor de presión diferencial DPT-20
- Presostato diferencial DW10
Versión en acero inoxidable, IP 65
- Manómetro de presión diferencial 732.14
Para la industria de procesos altamente resistente a sobrecarga hasta 650 bar

DPT-20 732.14 DW-10

Para participar enviar un correo a
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Solutions ▸ Hydrogen

Hydrogen

Hydrogen

Please select ...



Hydrogen - WIKA blog

Would you like to learn more about hydrogen? You can find more articles in our WIKA blog.

Applications

Hydrogen applications have been established in the process industry for decades, with demand primarily being driven by refineries, methanol & ammonia production and also in direct reduction in iron and steel production. Conventional hydrogen production typically uses natural gas or coal as feedstock. It is expected, in the future, that hydrogen will have to play an important role in decarbonising the world's economy - if produced from renewable energy sources e.g. solar and wind energy. Hydrogen processing, production, distribution and storage exposes the equipment used to extreme conditions, with temperatures as low as -253 °C, pressures of 700 bar and beyond and hydrogen migration-related impacts on metals and materials.

Wika has long been a partner to the hydrogen industry for instrumentation related solutions, with a proven track record, and is geared up to resolve any new challenges ahead. Whether the hydrogen is produced by conventional methods or based on renewable energies, we provide solutions for the entire value chain of the hydrogen industry. Learn more about Hydrogen in our [blog posts](#) and our [flyer](#).

